

The Boston Medical and Surgical Journal

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August 16, 1923

THE MASSACHUSETTS MEDICAL SOCIETY.

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The Massachusetts Medical Society.

SECTION OF OBSTETRICS AND GYNECOLOGY.

SESSION HELD AT PITTSFIELD, JUNE 13, 1923.

THE CONVULSIVE TOXEMIA OF PREGNANCY AND ITS TREATMENT.

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THE reader of a paper on an obstetrical topic finds himself handicapped in two ways; first, by the limitations of his subject, comprising, as it does, only a definite number of problems, most of which have been very thoroughly written about and discussed; and, on the other hand, by the breadth of his subject, involving, as it does, the most momentous events in the individual woman's life and the future of the race. So that to choose something which will be new, interesting and instructive to an audience not composed entirely of obstetrical specialists becomes a matter of considerable difficulty.

As some of his hearers may already know, the reader has for a number of years taken an especial interest in that particularly distressing form of toxemia known as eclampsia, and the following observations, which have been, in part, published from time to time, represent what he believes to be the most satisfactory summary of the condition and its treatment that we have up to the present moment.

Speculative theories in medicine have had and always will have a prominent place in the art. Much that we have considered proved in the past and apparently clear enough in theory; turns out to be fallacious in practice, and new lamps have been given for old in many instances, new lamps which have ceased to shine with the brilliancy they showed at the first lighting; and so we have, in part, at any rate, often returned to the scornfully discarded system for which they were exchanged.

Progress in the obstetric art, so called, has been more marked in the last two decades than at any time in the history of medicine, but this advance has been so rapid, especially through the medium of surgery, that owing to the comparative safety of modern aseptic technic the surgeon rushes the patient to the operating table, many times, it is feared, without due consideration of all the factors in the case. Far be it from the intention of the writer to belittle the marvelous strides and advantages of modern

surgery, of which he is one of the most ardent and earnest advocates, but let us not forget in our enthusiastic moments that the best results in surgery are obtained by judicious operating at the right time in cases which will be benefited by the operation and not made worse. Babies were born, grew to mature estate, produced other babies, and did surprisingly well, both in their health and their duties to society in general, long before Lister discovered and gave to the profession the results of his theories, which were so marvelous and far-reaching in their effects. True, of late years, we have reduced the mortality and morbidity of childbirth enormously in many directions, due to the knowledge and practical application of surgical principles to the subject in hand, but in other directions the improvement is not so marked if, indeed, any be noted at all, and it is of one of these instances that I wish to speak today.

Eclampsia, otherwise and more correctly known as the convulsive toxemia of the pregnant woman, has always been regarded as one of the most baffling conditions with which the physician has had to deal. Coming on with its lightning-like suddenness and, as was formerly supposed, in the absence of premonitory signs,—signs which we have lately learned are present and usually can be recognized both by means of better methods of diagnosis and a more accurate and thoughtful study of the complication,—it was, and still is, enough to strike terror into the mind, not only of the lay observer, but also of the medical attendant; and, as with the introduction of modern surgical methods it became easier and more simple to empty the uterus with speed, it is small wonder that operative intervention in these cases became the accepted and approved method of handling them. Appearing in the pregnant state, what could be more natural and reasonable than the theory that the pregnancy must be the cause of the condition and that, therefore, to help the patient, the provoking cause must be removed—a theory which seems sound and, to a certain extent, undoubtedly is.

Whether or not, however, the practice in popular vogue is always the best for obtaining this result is the matter before us for consideration today, and with your permission, I would like to take up the subject in the following order: 1, frequency of occurrence of eclampsia; 2, symptoms; 3, the pathology; 4, the treatments commonly in vogue, both past and present, with the idea of placing the complication on a more rational basis.

Williams,¹ in his text-book, considers that an eclampsia occurs once in 130 cases; Cragin,² once in 79 cases, and other authors in about the same proportion. At the New York Lying-In Hospital, in 120,000 cases we have had 890 eclampsias. This shows that we may expect in

hospital practice to see a case of this description once in about 185 patients. The season of the year apparently has some importance in this connection, as the cases are noted more frequently in the early spring than at other times, and also greater numbers are seen some years than others. Its occurrence is almost twice as common in primiparae as in multiparae (64.4 per cent., respectively), and, as might be expected, much more frequent in antepartum than in postpartum or intrapartum patients.

The greatest number of cases are noted between the ages of 20 and 25 years, which is in accord with the statement that the greater number occur in primiparae.

The symptoms may be divided into: (a) the premonitory or pre-eclamptic, and (b) those occurring after the convulsive seizure has taken place. Of these, the pre-eclamptic warnings are the most important, as like storm signals at sea, if properly noted in time, preparation for the approaching tempest can be made, and often a port reached, which will frequently, though not always, as some authors have said, enable us to avoid the storm altogether.

It is difficult to put in the proper order of their importance the pre-eclamptic signs and symptoms, many authorities disagreeing markedly on this point, but to the writer it seems that by far the most constant and most significant warning of an impending toxemic state in the pregnant woman is found in the blood pressure. In an otherwise normal patient, a sudden and permanent rise in the blood pressure is to be looked on with alarm and is never of slight importance.

Next in order we have the examination of the urine, not so much from the standpoint of the condition of the kidneys themselves, as an index of the degree of toxemia from which the patient is suffering; and, thirdly, the results of the ophthalmoscopic examinations of the eyes, which, as they are becoming more common, seem to point out to us a very important piece of information. Edema of the extremities, or of the body in general, tenderness over the gall-bladder, nasal hemorrhage, various digestive disturbances, constipation and so on, are undoubtedly of importance, and when present should be carefully noted, and if possible treated and corrected; but the increasing blood pressure, the urine examination, both regarding the increase of albumin and the presence of casts, and possibly the nitrogen coefficient (though this is of doubtful value) and the presence of progressive changes noted by the skilled use of the ophthalmoscope, are all that the skilled obstetrician needs to put him on his immediate guard for the onset of the eclamptic seizure. These, when present, with the convulsion, the coma, the cyanosis, the rolling eyes, clenched teeth and other familiar features, need no further description, and we

will now proceed to consider the pathology of the complication, in the light of what knowledge we have been able to accumulate during the last few years.

For a long time the disease was thought to be of renal origin, and as such was considered a uremia. More careful and extended observation, however, has shown that the kidney involvement is entirely secondary, as evinced by the fact that we frequently see cases in which, although typical in every other respect, clinically the kidney is not involved, or not until late.

The typical lesions found are those of a degeneration of the parenchymatous organs, notably the liver, followed by the kidney, less commonly by the spleen and pancreas; this takes the form of an albuminous change known as cloudy swelling, passing on to fatty degeneration early in the disease, and later, in the more aggravated forms, extending to all the tissues. In the other toxemias of the non-convulsive type, we find zonal necroses in the liver lobules. These necroses have been described by Schmorl³ of Germany and Williams⁴ in this country.

In eclampsia, on the contrary, we usually find extensive hemorrhages in and about the portal spaces, with very little zonal necrosis in the outer space of the lobule. The hemorrhages are general in character, usually being especially marked in the brain, about the corpus striatum and pons, rupturing into the fourth ventricle.

Welch,⁵ formerly pathologist to the New York Lying-In Hospital, explains these hemorrhages by suggesting that there is circulating in the blood a poison which causes agglutination of the red cells, forming emboli, and then the solution of the endothelium of the blood into the tissues. The blood pressure is usually high, especially during the convulsions, a condition which increases the brain hemorrhages occurring in these young subjects, who are usually free from arteriosclerosis. Welch believed that the poison causing the intoxication is probably an enzyme or a combination of enzymes which attack the cells and cause their destruction, the process being known as autolysis; this statement is particularly applicable to the liver.

Concerning the immediate sources of the poison, they have been regarded as four in number: the food, fermentations in the intestine, cell metabolism, and the fetus and placenta, with a possible fifth in the kidney. It is a well-known fact that the autopsy reports almost invariably show dilated ureters in women dying in advanced pregnancy, and from retention there may be some contributory share. With regard to the part played by the fetus and placenta, little is yet known, and whether they furnish a portion of the enzymes which attack the maternal organism, as has been declared by some,

is a question which the biological chemist has not yet answered.

Hunter⁶ states that eclampsia is due to a toxin, but what that toxin is has not yet been shown. McGarrison,⁷ in his work on the thyroid, gives the following suggestion: Spinal anesthesia is produced by injecting a local anesthetic, such as stovaine, into the spinal canal, that is, bringing a paralyzing substance into contact with the spinal cord. If, instead of a paralyzing substance, an irritant, like the toxin of eclampsia, is mingled with the cerebrospinal fluid, we would expect the results of irritation, namely, convulsions, as in eclampsia.

If it be true that the eclamptic toxin is to be found in the cerebrospinal fluid, it must get there through the choroid plexus, which normally secretes the fluid. The choroid plexus is a true secreting gland, and in health has a selective action which prevents toxic bodies passing from the blood to the cerebrospinal fluid. If from disturbed function this selective action is lost, toxins will pass through the gland to the spinal cord, and these toxins may be the toxins of eclampsia. McGarrison mentions two classes of toxins: (1) Those resulting from endogenous metabolism, and (2) toxins of bacterial action. Possibly the first class, by their presence in the cerebrospinal fluid, is responsible for the symptoms of eclampsia. The kidneys under normal conditions would secrete these toxins. In pregnancy they are much increased in quantity.

From McGarrison's work it seems reasonable that the bacterial toxins may bring about a disordered condition of the thyroid, and that they are originated in the alimentary canal. He mentions the frequency of the enlarged thyroid in pregnancy. The fetus causes increased activity of the thyroid, which is more easily disturbed on account of acting under greater pressure. Most obstetricians believe that the toxin of eclampsia is elaborated in the alimentary canal of the mother.

McGarrison⁷ concludes that the bacterial toxins elaborated in the alimentary canal are absorbed into the blood and carried to the thyroid apparatus, upon which they act injuriously and cause insufficient hormone production. This leads to choroid plexus insufficiency with loss of selective action, which permits (toxic) endogenous products of metabolism to enter the cerebrospinal fluid, where they act upon the central nervous system and produce the condition of eclampsia. If this view be correct, the rational treatment would be:

1. To remove the organisms which form the toxins from the blood.
2. To remove toxins, both bacterial and metabolic, from the blood.
3. To remove toxins from the spinal canal.

4. To supply hormones to activate the choroid plexus.

5. To treat symptoms as they arise.

LaVake⁸ states that in the field of obstetrics there is not a more interesting or more important problem than that of the etiology of pre-eclamptic toxemia and eclampsia. He groups the principal theories into: 1, bacterial; 2, auto-intoxication; 3, nephritic; 4, liver, and 5, ovular and placental.

The *bacterial theory* was presented as early as 1884. The main advocate of this theory has been Stroganoff, and his reasons for advocating are well worth citing: 1. General disease affecting all parenchymatous organs. 2. Acute infection commencing explosively or after a prodrome. 3. Fever accompanies it. 4. One attack confers immunity. 5. Marked genus epidemicus. In 1897 25 per cent. died. In 1898 he had nineteen cases with a zero mortality. 6. It is impossible to explain the increase of eclampsia in populous centers otherwise than by accepting the infection theory. 7. As an argument against the uremic and fetal theories he mentions 126 cases, ten of which occurred in the early months of pregnancy, and after the cessation of eclamptic seizures the pregnancy continued to normal termination. This could scarcely occur if eclampsia were due to toxins generated by the fetus. Early eclampsia usually affords the worst prognosis.

The *auto-intoxication theory* was brought forward by Bouchard, laying stress upon the toxins generated in intestinal stasis. He believes this view is tenable only from the standpoint of direct infection or absorption of toxic products resulting from the colon or other intestinal organisms.

The *nephritic theory* lays stress upon the presence of albuminuria and concomitant signs of nephritis with insufficient kidney function, the products of maternal or fetal metabolism being the offenders.

The *liver theory* accounts for the condition by the derangement of the liver structure and function as evidenced by anatomic and functional pathology.

The *ovular and placental theories* maintain the condition to be due to the generation of toxins from the products of conception or to infarcts of chorionic villi, and bring to their standard the force of the necessity of pregnancy in obtaining the condition.

LaVake states that in his experience the great majority of thromboses are caused by infection. For the past six years he has been interested in following cases with general pathologic conditions due to infections and trying to find the possible portal of entry. Obscure cases which clear up after the eradication of foci of infection are heard of every day. It has been proved that muscular pains have disappeared after the

removal of infected teeth and tonsils. Cases of neuritis have improved under the same procedure.

Also, the author has been especially impressed by the cases of nephritis which clear up and remain so, after thorough eradication of dental and tonsillar infection.

Instances have been reported of eclampsia in the mother and nephritis in the child. Many have adduced from this that the products of the fetal metabolism causing the nephritis in the child were the cause of the eclampsia in the mother. It has been shown that organisms can pass from mother to child, and it is possible that an infection was the cause of both conditions. Streptococci are the most common bacteria found in tooth and tonsillar infections, and their presence turns attention to those portals of entry in history-taking and in making complete physical examinations. The author calls attention to the absence of data regarding dental infection in many obstetrical histories and examinations. He presents 13 case histories of pre-eclamptic toxemia which came under his observation, cases which were typical, and he dwells especially upon the histories of infection, where obtainable, and the evidence of infection. The data obtained in these patients point to the fact that it is important to eradicate foci of infection as soon as a case of pregnancy presents, or, if this is not possible, especial care should be exercised in determining the approach of toxemia. Every case should have a thorough dental examination and should be under the care of a dentist throughout pregnancy. The author disregards the belief of the laity and some of the medical profession that any dental procedure at this time is dangerous. He has never seen a case resulting in the disaster of an abortion from this cause, and he has the assurance of many leading dentists that such an occurrence has never come under their observation, although such men would undoubtedly use their judgment in avoiding long, tiring, painful operations. The author concludes that adherence to the infection theory offers the best prospect of success in the prophylaxis of pre-eclamptic toxemia.

Thus it will be seen that while the etiology of the disease is by no means clear or settled, we still have made a marked advance over a few years ago, and are headed in the right direction. What the pathologist has done for us is to furnish the results of the findings post mortem so arranged as to give us more definite ideas on which to work, and we believe that the time is not far distant when the actual toxin, enzyme or organism which causes the complication, and its method of operation, will be discovered.

Analyzing the situation, then, we are dealing with a woman who in the pre-eclamptic stage is just on the edge of being out of balance, and

who in the convulsive stage has lost her balance, so that in the first condition we must devote our efforts toward preventing the pathology from getting worse, thus allowing the convulsions to occur, and in the second to preventing them from recurring after they have occurred once, and incidentally only, of relieving the patient of the cause of her complication, namely, the pregnancy; this latter, however, to be done without imposing on her a strain which will be greater than the one to which she is already being subjected.

I lay a great deal of stress on the convulsions, because I firmly believe that practically all of these cases die of brain hemorrhage due to rupture of the cerebral blood vessels, and that, while it is not universally true that the higher pressure during the convulsion is the causative factor in the rupture of the vessel, it undoubtedly is the main one, as shown by treatment, of which more later.

It is acknowledged that we occasionally see cases which, while otherwise presenting most of the features of the convulsive type, pass away without any actual convulsions, but autopsy reveals the same brain hemorrhages as those present in the patients in whom convulsions did occur. These, however, are more profoundly toxic than the others and are apt to run a much higher continuous pressure, which does not, therefore, affect our premise in the net result.

With these thoughts and facts before us, then, let us proceed to take up the final subdivision of our subject, namely, the treatment. This may be divided into:

1. Prophylaxis in the pre-eclamptic state.
2. Treatment of the actual condition when it has occurred. Both of these may be subdivided into: (a) medical or conservative, and (b) surgical or radical.

Prophylaxis means watchful waiting. Watchful of small indicative symptoms, always suspicious that the blow is about to fall, yet not rushing into operative procedures too hurriedly, but waiting for a definite indication; in short, preparedness, in the most marked sense of the word. Every pregnant woman should be regarded as potentially pre-eclamptic, and that suspicion should not disappear until she has passed through her puerperium. Routine blood pressure, urine examinations and ophthalmoscopic inspections, together with general and special physical examinations, should be made at frequent intervals, these to be increased generously if anything occurs which calls attention to any abnormal thing in the economy, and it is only by this constant care that results will be obtained. It is often tiresome to physician and patient alike, especially to the latter, who cannot understand the necessity for such proceedings, and it is rarely wise to communicate to the patient the thought which makes us feel the

desirability of these frequent visits. Still, the thing must be done, and faithfully, unless we are willing to take the chances of a severe catatrophe, which, when in spite of these precautions occasionally does overtake us, is apt to reflect severely upon our professional judgment and skill, if all means possible for prevention have not been employed.

The diet should be regulated, meat and eggs largely discontinued, fluids given freely, proper exercise ordered and seeing that it is performed, sufficient sleep obtained, and elimination by means of the bowels, bladder and skin secured. The teeth should be inspected and attended to. Printed instructions to patients are never given by the writer, as he prefers to consider each as an individual to be treated especially for the conditions suitable for her alone, and not as one of a general class.

In the large majority of cases, if watched and handled in the above manner, no symptoms of toxemia will develop. Occasionally, however, in spite of this care, we shall one day, usually toward the latter part of the pregnancy, note a rise in blood pressure, possibly slight, possibly considerable, the urine may contain a trace of albumin, and an occasional cast and eye changes may occur, slight but distinct.

We now come to the turn in the road. The signs point in two ways: shall we institute medical treatment and if so how rigid shall it be, or shall we terminate the pregnancy, and if so by what means? What shall be the determining factor for the one or the other treatment? The writer confesses that he knows of no positive rule which should be applied in every case, and the only thing that can be done is to be guided by one's experience and the judgment based on that experience. If rest in bed, low diet, possibly with an increase in the carbohydrate unit, elimination, etc., do not produce an amelioration of the symptoms, or if they rapidly grow worse, termination of the pregnancy should be considered before the patient has reached the point where the eclamptic seizures take place, and this termination, if decided upon after such consideration, should be brought about by some one of the gentler means, in order to avoid the intense shock which otherwise may and usually does occur if the more forcible means are employed. Chloroform should never be used, and rough manual dilatation is absolutely not to be tried. Cases properly watched and cared for will rarely arrive at this stage, however, and we, fortunately, shall not often be called on to make the decision.

So much for the prophylaxis; we have seen that by its efficient use the convulsive cases will be far less numerous than they have heretofore been. Nevertheless, there will always unavoidably remain the uncalculated few who, either from personal indifference or ignorance on their

part, neglect on the part of the medical adviser, or a combination of both, or the very small proportion who, though adequately and conscientiously cared for, still develop convulsions, and who will demand all the resources we can bring to bear to suitably handle their complication.

As already stated at the beginning, the general feeling is still strong that the removal of the uterine contents is the most important step to be taken in the way of relief for the condition, and with the advent of modern surgical technic many operative procedures for this purpose have been employed. Rough manual dilatation, followed by internal podalic version, with its resultant laceration and marked shock, vaginal hysterotomy, abdominal hysterotomy, have all been exploited and freely tried, and so firmly fixed are these maneuvers in the minds of most obstetricians that until comparatively recently they have been practically universally employed. The writer pleads guilty to having been one of the surgical enthusiasts until within the past five years.

Careful study of the results obtained both for mother and child, by these operative measures, compels thoughtful reflection, and when we consider that accouchement forcé gives a maternal mortality of about 30.8 per cent., with an accompanying fetal mortality of 30.35 per cent., that Cesarean section gives a high percentage of dead mothers, with only a slightly improved fetal mortality, it makes one wonder whether or not these means of delivery are, after all, so efficacious as they would seem.

With this idea in mind, in 1916, the writer made up his mind to at least try out the Rotunda method of treating the actual convulsive cases, giving the method a fair trial, and then to compare the results with the operative method, with the idea of ascertaining if there was not some way in which at least an improvement in the maternal mortality could be made.

Since that time he has had 107 cases in which this method has been definitely followed; 17 mothers have died, or 15.7 per cent. Excluding those who were actually moribund when first seen, seven in number, and in whom no treatment of any sort would have availed, this leaves a corrected mortality of 9.3 per cent. for the net result, with a stillbirth mortality of 25.4 per cent. Certainly a startling difference when compared with the operative method, which showed 30.8 per cent. in 250 cases reported by the writer in 1909.

After this time a somewhat modified treatment was instituted which brought the mortality down to 17.4 per cent. in 890 cases occurring in 120,000 confinements at the New York Lying-In Hospital up to January 1, 1921. This, however, includes 104 cases of the author, treated in the conservative manner, which reduced the mortality figures considerably.

We now come to the conservative treatment, so called. This procedure was consistently carried out in all cases and, unless the patients gave evidence of prompt delivery when the head reached the pelvic outlet, low forceps were permitted.

It is understood that all of the reported cases were pregnant or recently so; that they all had had one or more convulsions and represented true obstetrical convulsive toxemias.

Immediately on entrance to the hospital the patient's blood pressure is taken, a catheterized specimen of urine secured, and she is put into an isolation room, which is darkened, and as much quiet as possible obtained. She is then given by hypodermic injection, one-half grain morphine sulphate, her stomach is washed out, two ounces of castor oil is poured down the tube at the end of the lavage, and she is given a colonic irrigation of five gallons of 5 per cent. glucose solution.

If the blood pressure is over 175 systolic, phlebotomy is done, and a sufficient quantity of blood is extracted to bring the pressure down to 150; normal saline is not injected. In the experience of the writer, it is unwise to bleed the patient if the pressure is lower than 175 systolic, as, if, for any reason, a good deal of blood is lost during the delivery, the pressure will be reduced so low that the patient may die from shock. The same objection applies to the antepartum administration of large doses of veratrum viride.

She is now kept quiet and one-fourth grain morphine administered every hour until the respirations drop to eight per minute. At this time convulsions have usually ceased, the patient will have fallen into labor, and, as has happened in practically all of our cases, will be delivered normally or by an easy low forceps in a short time. Occasionally the use of a little ether is necessary to control the convulsions while waiting for the effect of the morphine. The convalescence is treated in the usual manner, as indicated by the symptoms, and has been, in our patients, significantly uncomplicated.

SUMMARY.

Summarizing our results, then, we see that:

1. The convulsive toxemia of pregnancy is a condition of whose exact cause we are unaware.
2. The toxemia is divided into two groups: (a) the pre-eclamptic stage, (b) the stage of convulsive seizures.
3. We can, by careful watchfulness and intelligent supervision, largely prevent the condition from becoming severe, or from occurring at all.
4. When it does occur, rough operative procedures do not give as satisfactory results, either for mother or child, as does more conservative medical treatment judiciously combined

with the gentler and less traumatic forms of operation.

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- 5 Welch: Bull. Lying-in Hosp., New York, Dec., 1909.
- 6 Hunter: Brit. Med. Jour., March, 1920, p. 469.
- 7 McGarrison: *Ibid.*
- 8 McGarrison: Jour. Lancet, 1916, xxvi, 600.

DISCUSSION.

DR. D. M. RYAN, Ware: We have listened to Dr. McPherson's paper with a great deal of pleasure and interest. Coming as Dr. McPherson does, and deriving much of his material and figures from one of the largest lying-in institutions in this country, what he has said must be regarded as of great significance. I am not disposed to take issue with Dr. McPherson, with the conclusions he has drawn from his large experience and study of this subject. I am quite ready to believe that simple medical treatment, carefully regulated, closely watched, gives the best results in eclampsia. I believe that all cases of eclampsia, whether severe or mild, do best by the minimum of obstetric interference. My own personal experience cannot add much to this subject, limited as it has been to the obstetric practice in a town of 9000 people. I have had, however, more than 2000 obstetric cases, and my records show but ten convulsive eclamptic cases. Of these, four were severe, four were mild; one case was postpartum with coma, a considerable number of convulsions—a dangerous condition that was relieved by a large dose, 20 minims, of tincture of veratrum viride; one other case, the only one where there was a maternal death, was a chronic nephritic, already moribund when seen. She had developed eclampsia at term.

I was glad to know that Dr. McPherson has changed his attitude from the surgical to the conservative treatment of these cases and that he is following the so-called Rotunda treatment. When I visited the Dublin Hospital in 1913, that institution had had ten years of very successful treatment with this method under the masterful leadership of Dr. Hastings Tweedie. The progress has been quite markedly successful, and recently at the Third British Congress on Obstetrics at Liverpool Dr. Solomon presented 68 cases with the low mortality of 8.82 per cent. treated at the Rotunda Hospital by this method, and the last 29 cases treated by this method with the improved technique were without a single fatality. At this same obstetrical congress Dr. W. T. Eden of London reported 547 cases of eclampsia from fifteen different hospitals in London, covering a period from 1911 to 1921, with a mortality of 22.1 per cent. The management of these cases is somewhat interesting. They were divided into five groups: first,

natural delivery; second, induction of labor, the delivery thereafter being spontaneous; third, assisted delivery, low forceps for the most part with occasional version; fourth, Cesarean section; and fifth, accouchement forcé. This latter method, accouchement forcé, has been severely condemned. The first three methods were considered the simpler. The mortality where Cesarean section was performed was 23.8 per cent. Natural delivery had a mortality of 12.3 per cent.; induction of labor, delivery thereafter being spontaneous, 9.6 per cent.; and the assisted delivery with the low forceps and occasional version had a mortality of 14.5 per cent. Thus you will see that under the three simpler methods, the conservative methods, the mortality was very much less than by Cesarean section.

I think, therefore, in conclusion I may say that natural delivery by the simpler methods has the smaller risk. Rapid and forcible dilatation is attended with danger. Cesarean section impairs the chances of a really successful outcome in either severe or mild cases.

DR. CLIFFORD S. CHAPIN, Great Barrington: I have listened with great pleasure to Dr. McPherson's paper. His summary of our present-day knowledge of the etiology of eclampsia is very interesting. His suggestions as to prophylactic treatment seem to me to be of particularly great value. I am glad he emphasizes the importance of clearing up dental and tonsillar infection in every pregnant woman, for I feel that this is a thing to which the average practitioner has not paid sufficient attention.

When we come to the eclamptic state, I feel that the treatment is definitely divided into three great groups: First, eliminative; second, sedative, and third, operative. For many years each of these methods has had its advocates among noted investigators and clinicians. I believe that all three have their place, and that in a great number of cases a combination of the three may be resorted to in the same case. I know that the advocates of the McPherson treatment (that is, the sedative) believe that that alone will give the best mortality figures. And if under this treatment a mortality of better than 10 per cent. can be accomplished those who rely on it are getting about as good results as is possible, but, unfortunately, all mortality figures must of necessity be so dependent upon the time and the progress of the illness when the treatment was instituted that it is extremely difficult to determine accurately. Each one of these three systems may be tried out separately, or two in combination, or finally all three together, if the case seems to require it. I believe that the results from the use of all three treatments are the best. The custom of operating immediately upon every case of eclampsia is

doubtfully efficient. If the emptying of the uterus can be accomplished without too great shock in any other way than by Cesarean section, I believe it should be done, but where there is no sign of labor, where the os is contracted, with a not easily dilatable cervix, and where the patient is becoming progressively worse, in spite of eliminative and sedative treatment, it seems to me that hysterotomy gives the patient the best chance for life.

I would like to ask Dr. McPherson what course he would follow in a case of this sort where eliminative and sedative treatment is apparently without avail—whether he would use dilators, or surgical interference.

In the matter of the large doses of morphine which the doctor advocates, I believe that the general practitioner would hesitate to use such large doses for fear of the bad effect it might have on the unborn child; still it would appear that if Dr. McPherson has had no bad results, the rest of us need not worry. It has been my practice to use *veratrum viride* in these cases, discontinuing it, however, if the blood pressure dropped below 160.

DeLee has truthfully said that unusual results in eclampsia are, in a large measure, due to luck. Until such time as we are enabled to discover the etiology of eclampsia we shall be, as we are now, groping in the dark and doing the best we may.

DR. FOSTER S. KELLOGG, Boston: I think it is the proper function in the discussion of a paper of this sort first to attempt to state one's views which are opposite to those of the reader of the paper, if there are any. But, unfortunately, from that point of view, everything I have seen of eclampsia and everything I have studied about it leads me to the same conclusions as those expressed by Dr. McPherson. I believe that eclampsia or toxemia with convulsions is best treated conservatively. I believe from a study of 490 toxemic cases at the Boston Lying-In Hospital, that accouchement forcé is the worst possible treatment and gives the highest possible mortality in toxemia with convulsions, and that Cesarean section is the next worst treatment, and that leaving these patients alone and filling them up with morphia with elimination at the same time will give the best results. Our maternal mortality in a study of 400 consecutive cases for another purpose—300 of which were toxemias without convulsions and 100 with convulsions—was roughly 25 per cent. in the toxemias with convulsions.

Dr. McPherson's remarks on the autopsies are extremely interesting, because it is true that over 90 per cent. of eclamptics die within 36 hours without any further diagnosis than eclampsia, and if, as he says, they die of cerebral hemorrhage, the control of the convulsions is all-important.

Regarding the etiology, to my mind, all theories today are worthless, and all work on the etiology has proven little or nothing. All we know about the etiology is that it happens when the woman is pregnant and not otherwise.

Regarding blood chemistry and other tests, each of us is as well equipped as the next man. Blood chemistry and liver and kidney function tests are today of absolutely no help in this problem, as far as I can see. They are interesting but they are not of any clinical value, and they will not be until the laboratory man and the clinician get closer together than they are now. The ophthalmoscope examination is of great importance and is underestimated. It will, again and again, if carefully done, lead you to early interference, if you believe in early interference, when nothing about the appearance of the patient, nothing in the blood picture, nothing in the urine picture, would make you interfere.

Now since eclampsia, toxemia with convulsions, carries a mortality of from 15 to 30 per cent., and since it occurs only in pregnancy, it would seem logical that to prevent eclampsia one should get rid of the pregnancy before the eclampsia occurs, and it is on that point that I would disagree with the gentleman who discussed the paper first. The mortality in toxemia without convulsions is relatively very low. Therefore, the logical thing to do when you are following a patient who has symptoms of toxemia is to empty that patient's uterus before she has convulsions; the fetal mortality is so high, particularly if you include the fetal mortality of the first ten days, and the maternal mortality is so high that the baby is a by-product and relatively of no importance, and I think you should take the attitude when you are handling toxemia without convulsions that you are going to lose the baby when you start, and that if you get a live baby, it is a matter of good luck.

Toxemia of pregnancy, it seems to me, should not be regarded as a divided condition, but as one single condition which starts in 90 per cent. of the cases not abruptly, not without perfectly good warning, and progresses to coma and convulsions and death if left alone, and that one should not stress the few exceptional cases in which the convulsions come on suddenly out of a clear sky, or in which the patient goes into coma without convulsions, or in which the patient has convulsions with a blood pressure of 130, but that you should consider the disease as a progressive disease from which, if you are following the patient carefully, you can get away at any time you want to at the time of election. And that brings up the point of how you will treat these cases of toxemia specifically and when you will interfere. Disregarding the baby entirely, you will interfere on progressive symptoms, including first the blood pressure,

then the urine, increase of albumin, then edema, and the subjective symptoms, as headache and eye symptoms. If those symptoms progress, you should interfere. Irritability and drowsiness and epigastric pain are warning signals, often coming too late to avoid convulsions.

Concerning the method of interference, there are two choices in toxemia of pregnancy without convulsions. One is the Voorhees bag or bougie or some other form of bag, *i.e.*, induction of labor from below; and the other is abdominal Cesarean section, because accouchement forcé is almost as bad for toxemias without as with convulsions. The bag lends itself to patients with multiparous cervixes; and I think that it should be laid down as a rule that bag induction should be used in all progressive cases with soft cervixes. Two-thirds of your cases occur in primiparas, so that the smaller number will have bag induction on that account. In primiparas certain obstetricians believe in bag induction and others in abdominal section, and from my experience I am for doing abdominal Cesarean section, because when your bag fails and your labor fails, you are up against a nasty condition ending in manual dilatation and operative delivery—accouchement forcé, admittedly the worst form of treatment. The mortality in Cesarean section without convulsions is very little higher than the ordinary Cesarean section mortality (tremendously higher, of course, if they have had convulsions). The septic rate in toxemias is very high, and that is one of the things that leads me to do Cesarean section on them instead of bag induction, because the original focus of infection is almost always in the split cervix. The rate (of infection) ran in this series we studied—14 per cent. in cases without convulsions, and 25 per cent. in cases with convulsions, against a 2.5 per cent. control.

Summarizing the treatment:—bag induction for multiparas without convulsions; abdominal section for primiparas with toxemia without convulsions; and conservative medical treatment with morphia controlling the convulsions for all patients who have had convulsions, together with venesection as indicated, and elimination of fluids and carbohydrates.

DR. PHILIP KILROY, Springfield: I have no special interest in obstetrics. I came here from a neurological viewpoint, thinking I might have some light thrown on the problem of epilepsy. It has often been a question to me, if we assume nephritis to be the cause of eclampsia, why we had so few convulsions in nephritis; and I thought possibly Dr. McPherson might have told us of something occurring in the pregnant which is not present in the non-pregnant, or in men, and which might throw light on the etiology of epilepsy. Naturally, in a perfectly honest way he admitted that he can't; that we don't

know anything about the etiology of eclampsia. He calls it a toxemia, and one might question the consistency of giving the name of toxemia to a thing the knowledge of which we have not. However, that might be quibbling. Personally, I have been struck by the fact that a great many people come to me with epilepsy, a great many women, I mean, who say their first attack occurred in pregnancy, and I wonder whether the eclamptic isn't, after all, an epileptic. In Springfield I am known as a crank on the epilepsy question. I maintain that the majority of mankind have rudimentary petit mal attacks once in a while. (Perhaps I am having one now.) In the old pre-eighteenth amendment days the police used to speak of rum fits, and I think you will admit that the people who got rum fits were potential epileptics. Certainly it wasn't due to rum alone.

Dr. McPherson has enumerated all possible causes of infection, including, naturally, in the piping times in which we live, teeth. Medicine today is a great Moloch, or disease is, to the placating of whose every symptom—and naturally eclampsia must be among them—there must be sacrificed at least one tooth.

The suggestion I want to make is that the eclamptic woman is potentially an epileptic woman. Of course, that doesn't throw light on the subject. Certainly one in 185 isn't too often for me to assume a possible epilepsy, when I think that the majority of people have petit mal. And I would like to offer the suggestion: Why not treat the individual from the start as a possible epileptic, and give bromide from the early stages, although I don't know what epilepsy is, and bromide is purely empirical treatment.

DR. EOLINE C. DUBOIS, Springfield: I cannot agree with Dr. McPherson that examination of the urine in these cases is of no value. On the contrary, I believe that functional kidney tests, the urea concentration test, and the diastase test are of inestimable importance, in the pregnant woman, in that they provide us with the earliest sign of an approaching toxemia.

DR. ROSS MCPHERSON, New York (closing): Mr. Chairman and members of the Society, I am much flattered by the amount of attention you have given to this paper and the discussion, taking up the points *seriatim*. I was interested to see in Dr. Ryan's cases that he had, in 2000 cases, one eclampsia in 200, which is relatively the same proportion as we see in the large figures; mine were one in 185, which is about the same proportion, and that shows they go along in Ware about as anywhere else. I think the figures he quotes from Solomon show, more than anything else can show, the futility of doing Cesarean section for this condition. Those figures were 23 per cent. of mortality, done primar-

ily for convulsive toxemia, which are about the ratio given all over the world. Now, the figures I have shown you of 9½ per cent. (9.5 per cent.) are not as good as they have been producing at the Rotunda for at least twelve years; Stroganoff of St. Petersburg reported 6.6 per cent. many years ago and has kept the figures as low as that. There is a clinic in Portland, Maine, which has about those figures, and there are men in Philadelphia who have about the same figures, and there are people on the Coast who are doing the same thing with a mortality of under 10 per cent. It doesn't seem to me that there is any comparison between Cesarean section and the conservative treatment.

Dr. Chapin in his discussion, to my mind, hits the nail more nearly on the head than anything that has been said today. If you will kindly remember, I undertook this series to demonstrate the results one way or the other, and it doesn't mean that I am always going to treat every eclamptic that I see by sitting around and leaving them alone. There are cases where operative treatment is indicated, but that does not show that a man should use violence, which was what I was brought up to do when we lost many cases from sepsis and hemorrhage and shock. I think eliminative treatment combined with sedative treatment and judicious operative treatment is the way to handle them, and in this manner you will get the best results.

Two people, Dr. Chapin and Dr. Marshall, have asked about the effect of morphine on the child. In no case in this series where there was a fetal heart on entrance was there a stillbirth in spite of the enormous doses of morphine. Of course, it is well known that the toxic patient, and the septic patient, will stand larger doses of opium than normal cases.

I am glad to see that Dr. Kellogg agreed with me as he did. In autopsies we didn't get a case that didn't show a brain hemorrhage. With us it is very difficult to get post-mortem examinations, and I don't suppose out of some 80 cases in all that we have had at the Lying-In Hospital, that died, that we have obtained more than 30 or 40 autopsies.

I am glad that Dr. Kellogg agrees with me about the examination of the eye. That is a thing whose results are becoming more noticeable and satisfactory and more men are doing it. The thing that puzzles me is how Dr. Kellogg decides—he didn't explain it to my satisfaction—how to figure out on which one of these cases you are going to induce labor and which one not. A man read a paper recently on Cesarean section for pre-eclamptic conditions. I don't know what a pre-eclamptic condition is. I know a nephritic woman who has become pregnant, and she has a different set of symptoms and is to be handled in a different way from a toxemia of pregnancy case, and I feel that if I did an in-

duction of labor on every case which I was afraid was going to develop convulsive toxemia, I would lose a whole lot of babies that I now get alive. If you could label them—this patient is going to have convulsions, get rid of it by emptying the uterus, it would be ideal, but I haven't been able to work it out.

I think the question of induction of labor by bags or Cesarean section was well put, and I am quite sure it was fairly put. I, personally, do not like bags for induction. I have given them up entirely. I have had many patients in whom I put bags and nothing happened, and later they developed a temperature. So I never use a bag except in cases where the membranes have ruptured. I have a predilection for the old-fashioned bougie and packing; and in the great proportion of induction cases I insert a soft rectal tube and pack around it. I know it is old-fashioned, but it works pretty well with me and I don't seem to have any trouble.

The question by Dr. Kilroy about the relationship of eclampsia to epilepsy—I don't know much about eclampsia and I know it, and I certainly don't know anything about epilepsy, and I am willing to accept the statement that I am a potential epileptic, and if I do much more work on eclampsia I am going to be an actual one. We see certain cases of epilepsy in pregnant women, but when he says that all pregnant cases ought to be treated as epileptics, I want to ask him how he treats epilepsy, as I never saw any treatment that did epileptics much good.

Dr. Dubois brought up the question of the urine chemistry. I believe that the urine chemistry should be done persistently and to the utmost degree; and there again I haven't seen any very satisfactory results. We have seen a lot of cases out of the normal, but when you come to group them, you don't seem to get anywhere. We have at the Lying-In Hospital an earnest pathologist who works right along with us; we have thrashed these things out and keep on doing them, and hope to get somewhere with them, but I haven't had a great amount of satisfaction.

With regard to the number of postpartum cases, there were a certain number of postpartum cases that came in with convulsions, and I am sorry that I haven't got the figures at hand. They were treated in the same way, morphinized and irrigated, and they did well.

Regarding the use of paraldehyde, I used to do a general practice and had use for paraldehyde in the pre-Volstead days, and I loved to give them paraldehyde, if they were of the delirium tremens type, and would see them fade away from a fighting drunk to one that had to go to a sound sleep. I haven't used it in the eclamptic cases, largely because I haven't thought of it. I am glad the suggestion was

made, and if I get the right sort of case I will use it.

I want to say just one word about a question that Dr. Chapin asked as to what I would do in the case of the type he spoke of, and to relate a case that occurred a month ago at the Lying-In Hospital. A woman came into the hospital in the early evening when I was operating. She had had three convulsions at home, one in the ambulance coming in, was brought up to the admitting room and had another convulsion. She had high pressure, was unconscious, was edematous and had solid albumin, and looked to be very ill. We happened to have at that time a large number of graduate students at the hospital and they all came up to see the case, which was especially interesting as we are not getting these patients so often nowadays, due to the prenatal care, and I described the treatment to them. She was eight months pregnant, not dilated, and with no fetal heart. She had several hot-water bottle burns, which had been administered by the family. I put her to bed and started her on the conservative treatment, and the attitude of the men was distinctly hostile. They asked questions which were pointed, and showed disapproval. The next morning she was better, and had not had any more convulsions. She went along through the day and had another convulsion at night, and I started her on morphinization. Again she grew much worse, her respiration got down to four per minute, and it looked as if she might die within an hour. I told the students that the patient was doing all right, that I expected to see her behave that way and that they need not worry although I must admit that I felt unhappy about her. The next morning I asked the house officer what time she died, and he said, "She is better; she is conscious; she is much better." She was conscious; she told me the day of the week and the day of the month, and went on and got entirely over her symptoms and suddenly went into labor and delivered herself normally of a macerated fetus. The students were much impressed and, I think, interested. That was the worst case I ever had that recovered. I believe if you follow this thing right down, you will get along well with this form of treatment.

I am greatly indebted to you for the interest you have taken.

ROUND TABLE CONFERENCE ON "HOW CAN THE SECTION OF OBSTETRICS AND GYNECOLOGY BE MADE MOST VALUABLE TO THE GENERAL PRACTITIONER?"

DR. C. D. McCANN, Brockton: Dr. Mongan has very kindly asked me to speak on the value to the medical profession of the publication in the *Boston Medical and Surgical Journal* of

the causes of death occurring in the puerperal state in Massachusetts, whether or not it would make men more careful if all deaths in the puerperal state were published, not giving the names of the physicians. I consider it a great compliment to be asked to speak at a conference like this but hesitate to speak on account of my limited experience, but I do think that such a publication as Dr. Mongan has outlined would be of great value to all, especially if a résumé of the cases were published with it, and I think it is possible to do that with the other work that is being done by Dr. Stone and his committee in looking up those deaths. I think it would be of great value, would provoke discussion, and would give us a lot of knowledge. Whether it would make men more careful I doubt, because it seems to me that the men who attend these meetings, for example, or the men who would read the *Journal* and look over those deaths to study and discuss them, are not the men who are careless. The men who are not as careful as possible do not come to these meetings, do not read the medical journals, but practice obstetrics with a false sense of security, which doesn't lend itself to a collection or assimilation of knowledge. So I don't believe there would be any improvement in our statistics because, as I have said before, the deaths which occur in the hands of men who attend these conferences and read the *Journal* belong more or less to the irreducible minimum. However, there is one thing I would like to see done, and that is a more complete and careful reporting of the number of pregnancies; that is, the number of abortions, the number of miscarriages which really occur, because until we find out the number of women in the State who become pregnant, there is really no idea of the relative number of deaths. In our town it is the custom to report the cases of abortion after the age of viability, though the law says that all abortions should be reported. It is possible to arrange to have every case of pregnancy reported; even if it were not done through the city or town clerk, it is possible to circularize all the physicians in this State and to find out in a confidential way how many cases they know that were pregnant and were not reported for one reason or another.

DR. BURTON E. HAMILTON, Boston: Dr. Mongan has kindly asked me to speak because he knows that I have conducted a heart clinic at the Boston Lying-In Hospital for the last two and one-half years. What ideas I can express on the subject of this meeting are based on this experience.

If one looks over a list of maternal deaths, one finds that most of them can be divided into three large groups: (1) those due to purely obstetrical complications, such as hemorrhage, toxemias, sepsis; (2) those due to acute infections, such as

influenza, plus the burden of pregnancy; and (3) those due to chronic disorders, such as heart or kidney diseases, plus the burden of pregnancy.

It strikes me that the average physician who handles obstetrics is relatively well armed to prevent, recognize and treat the disorders to be met in the group of cases with obstetrical complications; and that he is relatively helpless to contend with the complications that the last two groups present; for instance, the group that has chronic heart diseases. I do not believe that anyone present could lay down such precise and satisfactory methods for conducting a woman with rheumatic heart disease through pregnancy and labor as have been explained and discussed this morning for the conduct of a case with the convulsive toxemia of pregnancy. Now this may seem a rather small matter, but one per cent. of all pregnant women in Massachusetts have rheumatic heart disease. And if, as was told in discussion this morning, a general practitioner in many years of practice, who has delivered two thousand women, has encountered ten cases with convulsive toxemia, he ought, if his fortune is fair, to have handled twenty cases of rheumatic heart disease complicating pregnancy. And the death rate in this group ought not to be far below the average of the death rates quoted this morning for the convulsive toxemias. Forty-one maternal deaths occurred in the Boston Lying-In Hospital from January, 1921, to the first of June, 1923, and thirteen of these deaths were among women who had rheumatic heart disease. So it is not a small problem. Clearly the easiest place to gather information on this problem is in heart clinics within large lying-in clinics,—and this is being done. Besides the one I have the privilege of conducting are similar clinics at the New York Lying-In and the Sloane Maternity Hospitals. But it will take a long time to collect sufficient data from these clinics. I have followed less than one hundred cases of rheumatic heart disease through pregnancy in the last two and one-half years, even in the huge Boston Lying-In Clinic; and when the data are collected they will represent results from a somewhat restricted group within the whole community.

Certainly, if the experience in this matter of the general practitioners in this State could be gathered, the desired information would be found most quickly and most satisfactorily.

Now it may seem impractical—Utopian—to think that adequate case histories could be gathered from busy general practitioners by some central committee. But a somewhat similar attempt is succeeding practically in another medical problem. Men interested in hearts have formed special heart clinics in large hospitals in many eastern medical centers. There are forty-odd such clinics in New York City, six or seven

in Boston. These men have organized societies for the Prevention and Relief of Heart Disease. Such societies are in Boston, New York, Chicago, Philadelphia. Their object, in brief, is to collect information on heart disease problems, chiefly from men actually running heart clinics, and to disseminate this information to all concerned—laymen and physicians.

The societies consist essentially of a permanent secretary, an office or headquarters, a controlling executive committee (of small numbers made up of men active in actual clinical work with heart disease patients). The societies are inexpensive, and they function.

If there were a cardiological section within the Massachusetts Medical Society, it seems to me that such a section would be the logical place for what is now the Boston Society for Prevention and Relief of Heart Disease.

If it should be the mood of this meeting to form some permanent committee, with secretary and headquarters, to function throughout the year in the collection and dissemination of information on obstetrical matters, I hope the committee will not forget the heart clinic within the Boston Lying-In Hospital, which is greedy at any rate to receive information.

DR. C. E. MORGAN, Somerville: I believe that this Section should function the whole year. You will notice, most sections in medical societies exist for one day of the year and then they become comatose until the next annual meeting. I think this Section should be made interesting and instructive to every member of the Society, but it cannot be done unless you take some action and formulate some plan by which that action can be carried out and maintained. It may be necessary to incur some expense. My own feeling is that we should have a permanent clerk to whom we should give recompense.

This Section should have a column in the *Journal* devoted to obstetrics where the progress of obstetrics might be noted, difficult cases discussed and reviewed, and to which column every member might turn for instruction and aid in his work. It seems that it would take little sacrifice on the part of the members here to accomplish this. If you adopt these views, if you decide upon a plan, I think this will be the only section of this kind in the United States that will have a permanent work. We hear a lot nowadays about constructive legislation and constructive work. I hope to prove that I have some constructive ideas as to how a medical society should function.

In the beginning I told you that the laity were deeply interested in obstetrics—they call it maternity. There is no department of medicine that appeals so intimately to the lay mind on the emotional side as the pregnant woman,

the unborn child, and the new-born child. It is thought that as a profession we have not done as much in the improvement of the practice of obstetrics as we might. Perhaps we have not, collectively. Individually, I think we have. It is for you to decide what you are going to do. This is your opportunity to hold and control sensible medical opinion. I think there is intelligence enough in the Society; I think there is enthusiasm enough; I think there are enough members to work to bring about the above-mentioned plan; and I trust before we adjourn that somebody will make a motion that these ideas that I have tried to express will be carried out. I await the pleasure of this Section.

DR. THOMAS R. GOETHALS, Brookline: In order to carry out the desire of the officers of the Section to make the Section as valuable as possible to the general practitioner, it seems to me that some method should be invented or devised so that consecutive touch can be kept up between the Section and the practicing profession. It seems to me the best way to go about this is to publish in the *Boston Medical and Surgical Journal*, possibly every two weeks, a column dealing with the problems arising in connection with the pregnant, the parturient, and the puerperal patient. As Dr. McCann has said, there is a certain number of individuals who do not read the *Journal* and who do not attend medical meetings; even so, I think the best way to reach the greatest number is through the *Journal*, which goes to all members of the Society. In this way the problems of fetal and maternal mortality and other questions could be discussed as well as the routine care of the pregnant and puerperal patient, and also, as Dr. Hamilton has suggested, the important complications of pregnancy. It seems to me that the columns of the *Boston Medical and Surgical Journal* offer the best way to solve the problem before us.

I make a motion that the Chairman and Secretary be a committee to start in on the work as outlined by Dr. McCann, Dr. Hamilton and yourself.

DR. C. E. MORGAN: You have heard the motion of Dr. Goethals that the Chairman and Secretary be a committee to form and carry out a plan which has been enunciated by the Chairman, looking to the permanent function of this Section.

DR. W. P. BOWERS, Clinton: I have been tremendously interested in the discussions which have been presented here and especially with reference to the use of the *Boston Medical and Surgical Journal*. It seems to me that this particular suggestion is one of the most valuable things that has been brought out in recent times, because it will not only lead to permanent in-

terest in the work of this Section among its members but it will also promote, if the plan is carried out, the more or less regular dissemination of information among the members of the Society which will be of benefit; and further, it would seem that a plan which will provide for a permanent secretary and for the regular, constructive dissemination of information will be of the greatest value. Now, it will be necessary in developing that plan for a paid secretary, to consult the Committee on Membership and Finance because you cannot get an appropriation for the maintenance of this particular service unless it carries with it the approval of the Committee on Membership and Finance. So there should be incorporated in the motion a further provision, that the officers are directed to appeal to the Committee on Membership and Finance for their approval of the granting of an appropriation.

DR. R. D. YOUNG, Arlington: I heartily approve of the plan and I make this point—that the laity are in the attitude of being instructed and they will be instructed by the public health department if this valuable Section will not take the initiative and give them the right instruction.

DR. R. M. ASH, Quincy: I don't know that things have changed any from the time I was in the Medical School and Dr. Morgan was there, too, but I remember Dr. Richardson saying, "the medical student studies surgery and never practices it; he practices obstetrics and never studies it." The phenomenon of pregnancy, child-bearing and the puerperium is a natural one, and many women have died through interference. I would like to see this Section go on, because much can be done, even in preventive medicine. We are dealing with the individual herself, and there is much to be done with her, but there is much that we can't reach as physicians on account of the social relationship existing in the family—the relationship of man and wife—because civilization and society have perverted, to my mind, the sexual relationship. Many couples do not follow nature at any stage of the game, and for that reason some studies cannot get at the bottom of the trouble.

DR. C. E. MORGAN: If there is no objection, the amendment of Dr. Bowers will be incorporated into the motion. Are you ready for the motion, which is this: that the Chairman and Secretary be empowered to develop a plan by which this Section shall permanently function and also, if deemed necessary, to have a paid secretary, and to present this for approval to the Committee on Membership and Finance. Motion carried.

Original Articles.**NOTES ON BASAL METABOLISM. III.
ERRORS OF CLINICAL DETERMINATION.**

BY WILLIAM H. STONER, A.M., M.D., PHILADELPHIA.

[From the Biochemical Laboratories of the Philadelphia General Hospital and of the Graduate School of Medicine of the University of Pennsylvania.]

Errors in Preparation of Subject.—Errors under this heading are by far the greatest in magnitude and in frequency of occurrence of all the errors mentioned in this note. Unless the subject whose basal metabolic rate is to be determined has the customary light supper the night before the test, unless he has twelve to fourteen hours' fast of which at least seven are spent in sleep, unless he has no breakfast, unless he is brought to the metabolism station without effort on his part, unless he is given a half hour's preliminary absolute rest, and unless he is at ease physically and psychically—unless all these conditions are fulfilled the result of the test cannot be considered basal.

Even though twelve to fourteen hours elapse after the ingestion of food the test is not truly post-prandial unless the digestive and absorptive processes have terminated and this will not be the case if the meal of the evening before the test is heavy. For this reason only the usual light hospital supper is allowable. Drinking of alcoholic beverages during the evening before the test raises measurably the metabolic rate.

The fact that a patient goes to bed at 9 or 10 o'clock on the evening before the test does not insure proper preparation from the standpoint of sleep. The first night in a strange bed, especially in a hospital ward, is, for the majority of patients, anything but restful. In private practice where the determination is made in the home or office it has been found necessary to include in the instructions to the patient to sleep alone. It is well to inquire routinely into the number of hours the patient actually slept. In this way many otherwise unexplainable results may be understood.

When the supervision of the preparation is left to the subject himself it frequently happens that a cup of coffee, or a glass of milk is taken, a cigarette or two are smoked, or some other equally interfering act is performed either in ignorance or in wilful disobedience of the physician's instructions. Even in the hospital the patient may obtain food surreptitiously from a neighbor's tray or be given a cup of coffee by a nurse or attendant who is ignorant of the necessity for rigid care in the preparation. Information of value may often be obtained from either the private or the hospital patient by asking him what he had for breakfast.

Much difference of opinion exists among basal metabolists as to the legitimacy of basal metabolic rate determinations being made on subjects who go to the metabolic apparatus by their own efforts. Many believe true results can be obtained by giving the subject instruction concerning the evening meal, sleep, no breakfast, etc., to be carried out in the subject's home, by allowing him to come by any conveyance or even walk to the physician's office, and, after a 20 to 30 minute recumbent rest period, by making the usual determination. Barring the great probability of rise in metabolic rate above basal on account of exercise and exertion on the part of the subject, the uncertainty of the proper preparation as to sleep and food makes the value of these determinations as true basal metabolic rates extremely doubtful.

It is not obvious how, for example, an extreme cardiac case can, in the short period of a half hour, return to basal conditions after the exertion and excitement of transporting himself to the physician's office. It is highly improbable that a half hour suffices to bring the tubercular temperature of exercise to the normal line. It is in cases just as these that the determination of basal metabolic rate is of greatest differential value when properly performed. It is not impossible, however, that information of some value may be obtained from determinations carried out after home preparation and self-transport of the patient. If the operator has sufficient experience and judgment he may be able to make approximate estimates of the magnitude of interfering conditions and possibilities, but it is at least confusing to the literature and certainly not legitimate to report such results as basal. The word "basal" is used in this series of articles in the commonly conceded meaning of relative minimum metabolism obtained after the conventional preparation of rest, fast, etc., mentioned above, with a full knowledge of the fact that an absolute basal determination is impossible without thermal equilibrium between subject and environ.¹

In these hospitals determinations are made only on those patients who come into the hospital before supper the evening before the test and are kept under observation and strict preparatory regimen until the time of the test. It is believed that this is the only certain method of controlling the preparation.

Bowels and bladder should be emptied about an hour before the test. The discomfort and anxiety from these sources have caused many surprisingly high metabolic rates. The rise in calorie production caused by a bright light shining into a patient's eyes is sufficiently great to be measured. Other physical discomforts; as, an uncomfortable stretcher, too much or too little covering, a hairpin pressing into the head, mouthpiece pressing on the gums, too tight nose clamp, etc., must all be guarded against² (p. 47).

Far in excess of the errors caused by physical discomforts are those caused by psychical disturbances. The best evidence of this is the marked difference between the results of the first and second determinations, especially in the usual highly excitable, typical hyperthyroid case. It is the nurse's duty to assure the patient that the determination is a trivial incident, not an operation. Many patients are obsessed by the idea that they are getting gas as they did at a previous operation, or at the dentist's. Incidentally, in several cases they were right. Jones² quotes a case in which nitrous oxide was used instead of oxygen. After the determination has once been made with due consideration for the comfort of the patient, the psychic elevation of metabolic rate is usually almost absent in subsequent determinations. It is an error to base diagnosis upon, or even attach any clinical significance to the first determination of basal metabolic rate, or even upon two or more determinations on the same day.

Errors in Preparation of the Operator.—Very few persons are able to read the directions for use of an apparatus and then proceed directly to operate it with success. Practice is required. Many of the questionable results of basal metabolic rate determinations from which erroneous diagnostic conclusions have been drawn are due to lack of preparation of the technician making the observations. The chief point in the preparation of the operator, beyond an initial natural mental aptitude for such work, is a long, systematic training in studying normals, until duplicate determinations are possible within the allowable percentage of variation. When results within five per cent. can be obtained consistently, the technician is considered prepared for clinical determinations.

Errors of Apparatus.—Errors of apparatus are probably more numerous than is generally supposed. As in other laboratory work there is a tendency toward assuming the instruments to be correct and to perform as stated by the manufacturer. Fortunately in this work the errors in the apparatus are of comparatively low percentile value. Several of them, however, are of sufficient importance to be mentioned. A discrepancy of several per cent. was found between the actually measured spirometer volume and the volume indicated on the scale of one of the widely used respiration apparatus. The fact that another manufacturer provides for the periodic return to the factory of the essential measuring device of his apparatus for adjustment, indicates the probability of error in determination by this apparatus in the considerable number of cases where the operator does not recognize the necessity of the adjustment. The magnitude of this error depends upon the extent of damage done to the part. The lack of tightness about the gasketed inside soda-lime

tank allows a small part of the circulating volume of carbon dioxide to escape absorption. This slight error is practically eliminated by the technic indicated in the first note of this series on account of allowing the patient to breathe into the apparatus some moments before readings are taken. This establishes in the circulating air a fairly definite and low percentage of carbon dioxide which remains practically the same to the end of the test. This differential method of observation compensates for this as well as several other errors which are introduced when the spirometer is read the moment the patient is attached to it.

A constructional error which at the maximum introduces an error of several per cent. is introduced through uncompensated counterpoise for the spirometer bell. At the time of the initial reading of the volume the bell is but slightly immersed in the water seal and therefore has greater weight than at the time of the final reading. Spirometers of the Tissot type are compensated for this buoyancy in one of several ways: (1) by automatic syphoning of water from a fixed tank into the counterpoise, (2) by a helical wheel with a weight which travels from and toward the axis as the bell rises and falls in the water seal, (3) by the correct adjustment of the weight of the chain connecting the bell with its counterpoise. The calculation of these corrections is a difficult matter and seldom is there perfect compensation for all immersions of the bell. In the smaller spirometers, however, no attempt at compensation is made and the full error due to buoyancy is introduced into the determination. This is true of the counterpoised type, both cylindrical and sector, as well as of the simpler type without counterpoise. The error due to uncompensated counterpoise is reduced to negligibility by the employment of the four-minute volume technic described in the first of this series of notes.

Perhaps the greatest sources of error in the apparatus are leaks. These should be guarded against with extreme care and there is no excuse for their interfering with a result if a definite routine of testing for leaks before each test be established.

The blowers on the more popular types of respiration apparatus are of very inferior quality and are not efficient even when frequently cleaned and oiled. Ventilation tests should frequently be made. Valves⁴ of the flutter (Sadd) type are notoriously inefficient and require frequent renewing.

Clumsy, rigid supports for mouthpiece connection to patient, unless given careful and experienced attention, produce interfering discomfort and annoyance to the patient. Noisy and vibrating motors produce a similar effect.

Boothby⁵ is of the opinion that the chief source of error in the closed circuit type of apparatus is the incomplete carbon dioxide absorption. He substantiates this opinion by ref-

erence to the usual progressive increase in respiratory amplitude and the occasional increase in respiratory rate during the test. He suggests that unless check determinations can be obtained by the flying start and the standing start methods, carbon dioxide is probably incompletely absorbed. This opinion is probably correct. When observations are made as recommended in the first of this series of notes, however, that is, allowing the patient to breathe into and from the spirometer for some time before readings are taken, it is quite probable that the small amount of carbon dioxide in the air at the time of commencing the reading does not appreciably change throughout the test. And, since a differential volume is used in the calculation, this error becomes practically compensated.

Errors in Manipulation.—One of the largest and most common errors of manipulation is the adjustment of the nose clamp and mouthpiece or the mask. Operators without experience with gas masks frequently insert the two bite plates of the mouthpiece between the lips and place the rubber plate against the outsides of the lips instead of between the lips and the teeth. Obviously this method can but lead to failure. The errors of applying the nose clamp and mouthpiece uncomfortably were mentioned in a former section of this note. The water used for the spirometer seal should be at approximately room temperature. If it is not, the considerable change of temperature during the test introduces an appreciable error in calculation of the determination in the oxygen volume. This is discussed in this note with the errors of calculation.

Inattention to the frequent renewal of the soda lime is a common cause of low results. Adequate instructions in this matter are given by the purveyors of metabolism apparatus.

Errors of Observation.—Scarcely any of the many observations of a basal metabolic rate determination are exempt from error. Even in such simple matters as sex, age, height, weight, date, etc., errors have frequently been made. When it is borne in mind that the normal standard used in a comparison with the actual heat production is based upon these observations, their importance is evident.

A hasty technician has mistaken the sex of a boy with high pitched voice, and smooth face, as it is the custom in many hospitals to transport all patients to the metabolism station completely covered except the face. Even the head is sometimes covered with a towel pinned in the form of a skull cap. As the patient is often weighed and the height taken the evening before the test in order to facilitate the work, there is no occasion to disturb the patient and his covering. In a similar way old women with masculine voices and hairy faces have been recorded as males.

Many patients do not know their ages. In these cases it is sometimes of advantage to ask them of their memories of local or historical events, attempting to correlate such dates with the patient's school year or age at that time. Ages as recorded on hospital charts are notoriously inaccurate. Special care should be taken to avoid using the age recorded on admission to the hospital. An error of many years can be made in this way in the general hospitals of the larger cities where chronic cases are treated.

Care should be exercised to avoid the very common error of confusing such a value as 5 feet 8 inches with 58 inches. It is safer to express the height, if the English system is to be used at all, uniformly in inches. Similar comment might be made of the weight when the British system of stones and pounds is used. It is advisable to avoid the foot and stone units.

Confusing and interchanging the kilogram weights and pound weights, on scales equipped with both, are common. The guesses at weight of bathrobe and slippers of some observers are astonishing.

Interesting and surprising information is obtained by detailing independently various nurses, technicians and attendants, to whom this work is routinely assigned, to weigh and measure the heights of the same patients. One per cent. errors in height and three per cent. errors in weight are not uncommon. The results of an assignment such as suggested above makes clear the necessity for supervision of these simple observations.

Errors of timing a determination are very common especially when an inexperienced technician attempts to use a stop watch. In the method outlined in the first note of this series, possibility of error in time observation is practically eliminated. An ordinary watch with second hand is used. Stop watches run commonly as much as two per cent. slow or fast and should be regulated before use.

Although the thermometers issued with respiration apparatus are very inaccurate, little error can be introduced into the final result of a determination on this account, especially when the four-minute observation of oxygen consumption is used.

Errors of Calculation.—The simplest method of calculation is least subject to error. It was with this principle in mind that the calculation shown in the second of this series of notes was devised. That this principle may be carried too far, however, is shown by the simple percentile corrections recommended by Sanborn² (pages 241-255). These calculations are discussed in the next of this series of notes. In the first place, error is almost inevitable when a calculation is performed by the laborious methods of arithmetic multiplication and division. When slide rule and logarithms are used a definite formula should be followed,—a formu-

la which collects all the constants occurring in every determination into one constant. When logarithms are used all multiplications should be performed with a single addition and the sum of the logarithms of the divisors subtracted from this sum with as few operations, and, hence, as few probabilities of error, as possible. Boothby and Sandiford⁶ recommend a step-by-step calculation, in which the logarithms of all constants, as well as of variables, appear in each routine determination. This preserves all the intermediate values for future analysis of the data. In the simplified method of calculation recommended in the first note of this series the corresponding intermediate values may be read from a slide rule rapidly and with as great accuracy as is customary in such statistical analyses.

An error of calculation recognized early by Benedict⁷ is that of assuming the oxygen consumption to be the difference between initial and final volumes at a temperature midway between initial and final. The correct calculation is obviously to reduce the total initial and final volumes to 0°C. and then determine the difference. This total volume, as pointed out by Breuer⁸, includes the volume of the tubes, blower, etc., in addition to that of the bell itself. The temperatures of the different parts of the apparatus vary widely so that it is impossible to estimate with any degree of accuracy the error introduced by this assumption of an average temperature. Benedict⁷ (p. 455) makes an empirical correction which is the same as that applied by Roth⁹ (p. 496). When the temperature varies but one degree, as is the usual extreme in the four-minute period recommended in the technique of the first of this series of notes, the average temperature of the gas during the four minutes may be used in the calculation of the oxygen consumption with wholly negligible error. The practical point in this connection is the necessity for guarding against large temperature changes caused most commonly by air draughts through the room and by water in the spirometer at a temperature other than that of the room.

Enormous errors are introduced into basal metabolic rate determinations by unwise choice of standards. This constitutes the subject matter of the next note of this series.

Up until the work of Wilson¹⁰ a two to three per cent. error was introduced into each determination by practically all workers in this line. Benedict,⁷ in the description of the technique for use with the portable respiration apparatus, states that "no correction is made in this calculation for the tension of aqueous vapor, as it is assumed that the air as measured is dry. For the measurement of the total period, this assumption is correct. During the measurements in the two intermediate periods made by the Emmes method, there is unquestionably a certain amount of moisture in the air. Theoretically, corrections should be made for this mois-

ture. It has been shown, however, by means of a sensitive psychrometer placed in the air-circuit, that the percentage of moisture is so small that in practice it may be neglected in the calculation of the oxygen consumption during these short periods."

On this recommendation of Benedict, therefore, most observers made no correction for tension of aqueous vapor until Wilson apparently showed that the gas of the spirometer is approximately 80 per cent. saturated with aqueous vapor. It is difficult to reconcile these results with the principles of gas measurements, of which one of the axioms is the assumption that a gas in an enclosed space in contact with water is saturated with water vapor. Only a drop of water is routinely introduced into a gas measuring burette to keep the gases saturated with aqueous vapor. The gas of the spirometer in addition to bearing the water vapor from the patient's lungs comes into contact with a large surface of water not only at the water seal but also on the sides of the bell as it dips into and rises dripping from the water. As was stated in a previous note of this series, in these laboratories for the past three years full 100 per cent. saturation correction for the pressure for aqueous vapor has been applied consistently. Experimental investigation of this matter is contemplated.

Summary.—The various possible errors of the clinical determination of basal metabolic rate are evaluated and discussed from the standpoint of minimizing or eliminating them. The errors of greatest magnitude are those of faulty preparation of the subject.

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NOTES ON BASAL METABOLISM. IV.
SELECTION OF NORMAL STANDARDS.

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Introduction.—Much uncertainty exists in the literature concerning the magnitude of the variations in the results of basal metabolic rate determinations by different techniques, standards, and calculations. Since basal metabolic rate has come to be considered conventionally as the percentile variation of the actual from the expected heat production, it is obviously incorrect to express differences in the results by different methods on a percentage basis unless 100 be added to the conventional reports. It has become customary to follow the usage established by Boothby and Sandiford¹ (p. 15) of expressing these variations as "points." This method is not so enlightening as the usual scientific custom of expressing variations and errors in true percentages. For example, two different methods of calculating the basal metabolic rate from the same data may give the results +6 and +9 respectively. Although 9 is 150 per cent. of 6 it is incorrect to say that the latter result is 50 per cent. above the former, since the actual comparative figures are 106 and 109 respectively, from which it is seen that the latter is but 2.8 per cent. above the former. Similarly, the basal metabolic rate, +60, is 1.9 per cent. above the rate, +57. In the system of comparison of results by "points," these two pairs of results, which differ so widely in their respective variations would each be expressed indefinitely to differ by 3 "points." Throughout this note, variations between results will be expressed on a true percentile basis except when the work of others is quoted.

At least five different standards of comparison are used in the determination of basal metabolic rate. Calculations from the same observational data using these different standards may yield, for the same individual, basal metabolic rates differing by as much as 22 per cent. This difference is sufficient to classify a normal subject pathologically, unless the result be interpreted properly by a consideration of the standard used in the calculation. It is obvious that the conventional physiologic latitude of ± 10 cannot apply to all these varying systems of standards.

Aub and DuBois Standards.—The oldest of the several systems of standards is that of Aub and DuBois.² These "normals" consist of a tabulation, for males and females between ages 14 to 80 years, by two-year periods from 14 to 20 years and by decades from 20 to 80 years, of the calories per hour per square meter body

surface based on the DuBois and DuBois³ height-weight formula. These "normals" have been retained in their original form by the larger and older basal metabolism clinics of this country. The adoption of the later standards by these clinics would make difficult the correlation of data collected before and after a change in standards. This reason alone may justify the established clinics in adhering to the standards of Aub and DuBois. For the newer clinics, however, where this factor is of less importance, it seems advisable to discard these standards for the more recent ones in more close accord with the available normal data.

Interpolated Aub and DuBois Standards.—Probably the most frequent criticism of the Aub and DuBois standards is the fact that they are not interpolated between the decades above 20 years, nor between the two-year periods below 20 years. For example, the normal heat production, by these standards of a man 39 years of age will be the same as that of a man 20 years of age and of the same body surface and 2.5 per cent. more than that of a man 41 years of age and of the same body area. It is interesting to note that much time, energy and money are expended in the elimination of errors of as little as one one-hundredth this magnitude from basal metabolic rate determinations. To overcome these inaccuracies many attempts at interpolation have been made. Some of these interpolations have been made by centering the stated value in the decades and the two-year periods as is done by Harris and Benedict⁴ (p. 123). Others place the stated value at the zero, or one, or beginning, of the decade, and still others at the nine, or ten, or end, of the decade. These interpolations are made graphically by French curves on cross-section paper or by actual mathematical calculation by the usual method of successive differences. The irregularity of the curve caused by the identity of the values for the third and fourth decades for males is better corrected by centering the stated value on 30 years than by flattening the curve to identical values from 25.5 to 35.5 years.

Harris and Benedict Standards.—Chronologically, the next standards to appear were the multiple prediction formulas of Harris and Benedict⁴ (p. 227) and tables (pp. 253-266), which give values of twenty-four-hour calorie production for both sexes, ages 21 to 70 years, statures 151 to 200 centimeters, and weights 25 to 124 kilograms, in one-tenth kilograms. These formulas follow:

$$h \text{ (Males)} = 66.4730 + 13.7516w + 5.0033s - 6.7550a$$

$$h \text{ (Females)} = 655.0955 + 9.5634w + 1.8496s - 4.6576a$$

in which h = expected calories in twenty-four hours,

w = subject's weight in kilograms.
s = subject's stature in centimeters.
a = subject's age in years.

These formulas were derived from a statistical study of series of normal subjects and represent the values to which the individuals of these series conform with least error when correlated in relation to sex, weight, stature and age. Harris and Benedict⁴ (p. 193) show that "results as good as or better than those obtainable from the constant of basal metabolism per square meter of body-surface can be obtained by biometric formulas involving no assumption concerning the derivation of surface-area but based on direct physical measurements." They (p. 199) consider that "the 'body-surface law' is at best purely an empirical formula," and that "it has furnished a somewhat better basis for the prediction of the metabolism of an unmeasured subject than does body-weight."

The prediction values of Harris and Benedict are coming more and more into use as the younger men and more recent clinics are installing clinical calorimetry departments. The older workers in this field adhere to the older Aub and DuBois "normals" and present data in a way which seems to justify their choice. Boothby and Sandiford⁵ (p. 800), for example, present the analysis of 102 cases showing that "the basal metabolic rates, as calculated by the DuBois method, are more often between -5 and +5 per cent., between -10 and +10 per cent., and between -15 and +15 per cent. than by the Harris and Benedict method."

It seemed highly improbable that the mathematically derived formulas of Harris and Benedict should give greater scatter than the interpolated standards of Aub and DuBois, especially when considered in connection with the more or less approximate values for surface area. For this reason an analysis was made of the data from which these conclusions were drawn.

Boothby and Sandiford¹ (p. 15) show, in a series of 404 comparative determinations, that the Harris and Benedict formulas give basal metabolic rates averaging 6.5 "points" higher than do the DuBois standards. The series of 102 "normals" of Boothby and Sandiford¹ (p. 794) shows the averages by the two methods of calculation to vary by 4.2 "points." For this reason it appears misleading to present as an argument for the accuracy of the DuBois standards the fact that the results by these standards are more often than by the Harris and Benedict standards between pairs of figures representing a latitude centered upon zero, the average normal for the DuBois standards; just as it would be misleading to compare the results by DuBois standards unfavorably with the results by the Harris and Benedict standards by centering the pairs of inclusion figures upon +4.2, the average in this series for the Harris

and Benedict standards. Of this same series, 90 per cent. by the Harris and Benedict calculation and 85 per cent. by the DuBois method fall between -5 and +15. This is obviously as erroneous an argument for the superiority of the Harris and Benedict standards as is the fact that 94 per cent. by the DuBois standards and 83 per cent. by the Harris and Benedict standards fall between -10 and +10, an argument for the superiority of the DuBois standards. A better method is to compare the percentage of results falling between pairs of points centered upon zero for the Aub and DuBois calculation and upon +4.2 or, approximately, 4 for the Harris and Benedict calculation.

TABLE I.

Comparison of the percentages of basal metabolic rates of 102 normal individuals of Boothby and Sandiford¹ included between pairs of points centered, for the Aub and DuBois standards, upon ± 0 ; and for the Harris and Benedict standards, upon +4.

Method.	Range.	Per Cent.
A & D	-5 to +5 incl.	64
H & B	-1 to +9 incl.	65
A & D	-10 to +10 incl.	97
H & B	-6 to +14 incl.	89
A & D	-15 to +15 incl.	100
H & B	-11 to +19 incl.	98

The accompanying table, showing the comparison of the two methods of calculation by this method indicates that, even this series of normals, selected to illustrate the superiority, in regard to minimum deviation, of the Aub and DuBois standards, to those of Harris and Benedict, gives a percentage of results: (1) within the 11 point range, slightly in favor of the Harris and Benedict standards, (2) within the 21 point range considerably in favor of the Aub and DuBois standards, and (3) within the 31 point range, slightly in favor of the Aub and DuBois standards. It is seen that the minimum scatter argument is of little weight when this analysis is applied.

Two possible explanations of the discrepancies between the figures of Boothby and Sandiford and those of Harris and Benedict are: 1st, that their respective series were not equally normal; and 2nd, that the respective techniques were not identical. The first possibility is very probable, as it is the experience of all who determine basal metabolic rates of hospital patients, by the Harris and Benedict standards, that the normal cases average somewhat higher than ± 0 , showing that these cases are not exactly comparable to the series from which the prediction formulas were derived. For this reason it has become customary in these hospitals to center the normal physiologic latitude on 5 rather than ± 0 . It is also the practice here to extend the customary 21 points of physiologic latitude to 31 points, from -10 to +20, desig-

nating all results falling between these limits as not abnormal. The first of this series of notes shows that the results of basal metabolic rate determinations may differ enormously for different technics, especially by tests of different durations.

Modified Aub and DuBois Standards.—Means and Woodwell² have shown that, if from the Aub and DuBois standards there be subtracted 1.8 calories, results are obtained which are, on the average, practically identical with those obtained from the Harris and Benedict standards. Since 1.8 is approximately 4 or 5 per cent. of the average stated hourly calorie production per square meter it appears that Means and Woodwell have but restated in a slightly different way the fact stated by Boothby and Sandiford¹ early in 1920. One might similarly state that by adding 4 or 5 per cent. to the standards of Harris and Benedict results on the average practically identical with those of Aub and DuBois may be obtained. Means and Woodwell did not recommend changing the standards of Aub and DuBois, nor is it here

curves appear rather abrupt above the 8 to 10 year period. The more usual standards for children, discussed later in this note, are to be preferred.

Probably a greater number of basal metabolic rate determinations are calculated by the Sanborn³ (p. 241) percentile correction method than by any other one method. This fact justifies a few remarks in adverse criticism. Unfortunately, the class of operators for whom this method was devised does not as a whole recognize the possibilities of such typographical errors as the 1 per cent. instead of 10 per cent. in the derivation of normal consumption of oxygen for males ages 16 to 18. Two of the three illustrative examples on the same page contain similarly confusing errors.

The accompanying table shows the variation of the Sanborn percentile correction calculation, derived both from the original Aub and DuBois standards and from the unauthorized, hybrid, Aub and DuBois (—1.8 calories) standards. For convenience of reference the actual calorie values are also tabulated. The percen-

TABLE II

Variation of Sanborn's percentile calculation from original Aub and DuBois Standards

Age	Aub & DuBois Original		Sanborn Percentile Calculation from Aub & DuBois Original				Aub & DuBois -1.8 Hybrid		Sanborn Percentile Calculation from Aub & DuBois -1.8 Hybrid			
	Male	Female	Male	Per cent Deviation from Original	Female	Per cent Deviation from Original	Male	Female	Male	Per cent Deviation from Original	Female	Per cent Deviation from Original
14-16	46.0	43.0					44.2	41.2				
16-18	43.0	40.0	43.5	+1	40.4	+1	41.2	38.2	41.5	-3	38.6	-3
18-20	41.0	38.0	41.5	+1	38.6	+2	39.2	36.2	39.6	-3	36.8	-3
20-30	39.5	37.0	39.5	±0	36.7	-1	37.7	35.2	37.7	-5	35.1	-5
30-40	39.5	36.5	39.5	±0	36.7	+1	37.7	34.7	37.7	-5	35.1	-4
40-50	38.5	36.0	39.5	+3	36.7	+2	36.7	34.2	37.7	-2	35.1	-2
50-60	37.5	35.0	37.9	+1	35.2	+1	35.7	33.2	36.2	-3	33.7	-4
60-70	36.5	34.0	36.7	+1	34.1	±0	34.7	32.2	35.1	-4	32.6	-4
70-80	35.5	33.0					33.7	31.2				

recommended to change the standards of Harris and Benedict for the purpose of uniformity. Sanborn,³ however, apparently either considering this step toward uniformity desirable, or misunderstanding the purpose of Means and Woodwell, introduced this hybrid standard into his stereotyped percentile system of calculation of basal metabolic rate issued with instructions for use of his respiration apparatus. On the other hand, the original uninterpolated, uncorrected Aub and DuBois standards are employed in calculating the graph used with the Metabolimeter. However, the calorie productions per hour per square meter are stated for each two-year age period from 6 to 14 years. In these values in the deviation between male and female

tile errors shown in the table, together with the wide variation from true values of actual oxygen consumption as calculated by the Sanborn³ (p. 255) percentile correction of volume for temperature and pressure, seem to be sufficient reason for excluding all results so calculated from the recognized legitimate data on this subject.

Dreyer Standards.—These standards are discussed separately in the next note of this series. It is probable that, as normal data by these standards accumulate, their use will increase. It is doubtful, however, that they will be applicable to that special class, girls between 12 and 18, to which so much attention has been given by Benedict and his associates. For adults of both

sexes, however, there is evidence seeming to show that the Dreyer standards are probably in more close accord with normal data than either the Aub and DuBois or the Harris and Benedict standards. Moreover, it is not improbable, since Benedict⁹ has shown the Harris and Benedict male formula to be applicable from one year to old age, that Dreyer's male formula may prove to have a similar wide range of applicability.

*Benedict and Talbot Standards.*¹⁰—These standards are for the twenty-four-hour calorie production of children,—males from 2.5 kg. to 38 kg. and females from 2.5 kg. to 32 kg., based entirely upon weight.

*Benedict Standards.*⁹—These standards tabulate the expected twenty-four-hour calorie production per kilogram for girls from ages 12 to 18. The values given are slightly revised from the values given by Benedict, Talbot and Hendry.¹¹

Summary.—The older clinics are probably justified in adhering to the standards of Aub and DuBois² for purposes of correlation of old with present results. The standards of Harris and Benedict⁴ and of Dreyer³ are recommended for adults of both sexes and for male children. For girls below age 12, the standards of Benedict and Talbot,¹⁰ and for those from ages 12 to 18, the standards of Benedict⁹ are recommended. Hybrid, conciliatory, arbitration standards are condemned. More important than the choice of standard is the necessity, on account of the wide variation in the results obtained by calculation from the various standards, for the diagnostician to acquaint himself with these standards and to know which is used in the calculation of results reported to him.

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NOTES ON BASAL METABOLISM. V. TABLES OF VALUES OF DREYER'S FORMULAS.

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Harris and Benedict,¹ in a statistical study of a series of determinations of basal metabolic rates of 136 normal males and 103 normal females, derived the following correlation formulas based upon the heights, weights, ages and sexes of the subjects:

$$h \text{ (Males)} = 66.4730 + 13.7516w + 5.0033s - 6.7550a$$

$$h \text{ (Females)} = 665.0955 + 9.5634w + 1.8496s - 4.6756a$$

in which

h = expected calories in twenty-four hours

w = subject's weight in kilograms

s = subject's stature in centimeters

a = subject's age in years

Harris and Benedict¹ (p. 193) recommend these formulas for the prediction of heat production in preference to the older "normals" of Aub and DuBois,² based upon body surface, on account of the fact that the Harris and Benedict formulas substitute actual biometric measurements for the artificial measurement, surface area, which, at best, is subject to considerable error.

Dreyer,³ analyzing the data for 109 of the 136 males and the 103 females used by Harris and Benedict in deriving their formulas, showed that stature is not a true biometric measurement. He derived the following formulas from the values of which the variation of individuals of this normal series is less than from the values of the formulas of Harris and Benedict, on account of the fact that the erroneous biometric measurement, stature, is omitted:

$$h \text{ (Males)} = \frac{\sqrt{w}}{0.1015 a^{0.1333}}$$

$$h \text{ (Females)} = \frac{\sqrt{w}}{0.1127 a^{0.1333}}$$

in which

h = expected calories in twenty-four hours,

a = subject's age in years,

w = subject's weight in grams.

Still less variation from these formulas occurs when the subject's theoretic weight, as calculated from the trunk length (sitting height) and chest circumference, is substituted for the actual weight. The formulas for calculating these theoretic weights are given by Dreyer.^{4, 5} The formulas given in Dreyer⁵ (p. 3) are incorrect. The coefficients should be included under the root vinculum.

	25.0	25.5	26.0	26.5	27.0	27.5	28.0	28.5	29.0	29.5	30.0	30.5	31.0	31.5	32.0	32.5	33.0	33.5	34.0	34.5
16	1076	1087	1098	1108	1119	1129	1139	1149	1159	1169	1179	1189	1199	1208	1218	1227	1237	1246	1255	1264
17	1068	1078	1089	1099	1110	1120	1130	1140	1150	1160	1170	1180	1189	1199	1208	1217	1227	1236	1245	1254
18	1060	1070	1081	1091	1101	1111	1121	1131	1141	1151	1161	1171	1180	1190	1200	1210	1220	1227	1236	1245
19	1052	1062	1073	1083	1093	1103	1113	1123	1133	1143	1152	1162	1171	1181	1190	1199	1209	1218	1227	1236
20	1045	1055	1065	1076	1086	1096	1106	1116	1125	1135	1144	1154	1163	1173	1182	1191	1200	1209	1218	1227
21	1038	1048	1058	1069	1079	1089	1099	1108	1118	1128	1137	1147	1156	1165	1174	1184	1192	1201	1210	1219
22	1032	1042	1052	1062	1072	1082	1092	1101	1111	1121	1130	1140	1149	1158	1167	1176	1185	1194	1203	1212
23	1025	1035	1045	1056	1066	1076	1085	1095	1105	1114	1123	1133	1142	1151	1160	1169	1178	1187	1196	1205
24	1019	1029	1039	1050	1060	1070	1079	1089	1098	1108	1117	1126	1136	1145	1154	1163	1172	1180	1189	1198
25	1014	1024	1034	1044	1054	1064	1073	1083	1092	1102	1111	1120	1129	1138	1147	1156	1165	1174	1183	1191
26	1009	1019	1029	1039	1049	1058	1068	1077	1087	1096	1105	1114	1123	1132	1141	1150	1159	1168	1177	1185
27	1004	1014	1024	1034	1043	1053	1062	1072	1081	1090	1100	1109	1118	1127	1136	1145	1153	1162	1171	1179
28	999	1009	1019	1029	1038	1048	1057	1067	1076	1085	1094	1103	1112	1121	1130	1139	1148	1156	1165	1173
29	994	1004	1014	1024	1033	1043	1052	1062	1071	1080	1089	1098	1107	1116	1125	1134	1142	1151	1160	1168
30	990	1000	1009	1019	1029	1038	1048	1057	1066	1075	1084	1093	1102	1111	1120	1129	1137	1146	1154	1163
31	986	995	1005	1015	1024	1034	1043	1052	1061	1071	1080	1089	1097	1106	1115	1124	1132	1141	1149	1158
32	981	991	1001	1010	1020	1029	1039	1048	1057	1066	1075	1084	1093	1102	1110	1119	1128	1136	1144	1153
33	977	987	997	1006	1016	1025	1034	1044	1053	1062	1071	1080	1088	1097	1106	1114	1123	1131	1140	1148
34	973	983	993	1002	1012	1021	1030	1039	1048	1057	1066	1075	1084	1093	1101	1110	1118	1127	1135	1144
35	970	979	989	998	1008	1017	1026	1035	1044	1053	1062	1071	1080	1089	1097	1106	1114	1123	1131	1139
36	966	976	985	994	1004	1013	1022	1031	1040	1049	1058	1067	1076	1084	1093	1101	1110	1118	1127	1135
37	963	972	982	991	1000	1010	1019	1028	1036	1045	1054	1063	1072	1080	1089	1097	1106	1114	1122	1130
38	959	969	978	987	997	1006	1015	1024	1033	1042	1051	1059	1068	1077	1085	1094	1102	1110	1118	1126
39	956	965	975	984	993	1002	1012	1021	1029	1038	1047	1056	1064	1073	1081	1090	1098	1106	1115	1123
40	953	962	971	981	990	999	1008	1017	1026	1035	1044	1052	1061	1069	1077	1086	1094	1103	1111	1119
41	949	959	968	977	987	996	1005	1014	1023	1031	1040	1048	1057	1066	1074	1083	1091	1099	1107	1115
42	946	956	965	974	984	993	1002	1011	1019	1028	1037	1045	1054	1062	1071	1079	1087	1096	1104	1112
43	943	953	962	971	980	989	998	1007	1016	1025	1034	1042	1051	1059	1067	1076	1084	1092	1100	1108
44	940	950	959	968	977	986	995	1004	1013	1022	1030	1039	1048	1056	1064	1072	1081	1089	1097	1105
45	938	947	956	965	974	984	992	1001	1010	1019	1027	1036	1044	1053	1061	1069	1078	1086	1094	1102
46	935	944	953	963	972	981	990	998	1007	1016	1024	1033	1041	1050	1058	1066	1074	1082	1090	1098
47	932	942	951	960	969	978	987	996	1004	1013	1021	1030	1038	1047	1055	1063	1071	1079	1087	1095
48	930	939	948	957	966	975	984	993	1001	1010	1018	1027	1035	1044	1052	1060	1068	1076	1084	1092
49	927	936	946	955	964	972	981	990	999	1007	1015	1024	1032	1041	1049	1057	1065	1073	1081	1089
50	924	934	943	952	961	970	979	987	996	1005	1013	1021	1030	1038	1046	1054	1062	1070	1078	1086
51	922	931	940	949	958	967	976	985	993	1002	1010	1019	1027	1035	1043	1051	1060	1068	1075	1083
52	920	929	938	947	956	965	973	982	991	999	1008	1016	1024	1033	1041	1049	1057	1065	1073	1080
53	917	927	936	944	953	962	971	980	988	997	1005	1013	1022	1030	1038	1046	1054	1062	1070	1078
54	915	924	933	942	951	960	969	977	986	994	1003	1011	1019	1027	1035	1043	1051	1059	1067	1075
55	913	922	931	940	949	958	966	975	983	992	1000	1008	1017	1025	1033	1041	1049	1057	1065	1072
56	911	920	929	938	947	955	964	972	981	989	998	1006	1014	1022	1030	1038	1046	1054	1062	1070
57	909	918	927	936	944	953	962	970	979	987	995	1004	1012	1020	1028	1036	1044	1052	1060	1067
58	907	916	924	933	942	951	960	968	976	985	993	1001	1009	1018	1026	1034	1042	1049	1057	1065
59	904	913	922	931	940	949	957	966	974	983	991	999	1007	1015	1023	1031	1039	1047	1055	1062
60	902	911	920	929	938	946	955	964	972	980	989	997	1005	1013	1021	1029	1037	1044	1052	1060
61	900	909	918	927	936	944	953	961	970	978	986	995	1003	1011	1019	1027	1035	1042	1050	1058
62	899	907	916	925	934	942	951	959	968	976	984	992	1001	1009	1017	1025	1032	1040	1048	1055
63	897	906	914	923	932	940	949	957	966	974	982	990	998	1006	1014	1022	1030	1038	1046	1053
64	895	904	912	921	930	938	947	955	964	972	980	988	996	1004	1012	1020	1028	1036	1043	1051
65	893	902	910	919	928	936	945	953	962	970	978	986	994	1002	1010	1018	1026	1033	1041	1049
66	891	900	909	917	926	935	943	951	960	968	976	984	992	1000	1008	1016	1024	1031	1039	1046
67	889	898	907	916	924	933	941	949	958	966	974	982	990	998	1006	1014	1022	1029	1037	1044
68	888	896	905	914	922	931	939	948	956	964	972	980	988	996	1004	1012	1020	1027	1035	1042
69	886	895	903	912	921	929	937	946	954	962	970	978	986	994	1002	1010	1018	1025	1033	1040
70	884	893	902	910	919	927	936	944	952	960	968	976	984	992	1000	1008	1016	1024	1031	1038
71	882	891	900	909	917	925	934	942	950	959	967	975	983	991	998	1006	1014	1022	1029	1036
72	881	890	898	907	915	924	932	940	949	957	965	973	981	989	996	1004	1012	1020	1027	1034
73	879	888	897	905	914	922	930	939	947	955	963	971	979	987	995	1002	1010	1018	1025	1033
74	878	886	895	904	912	920	929	937	945	953	961	969	977	985	993	1001	1008	1016	1023	1031
75	876	885	893	902	910	919	927	935	943	951	959	968	976	983	991	999	1006	1014	1022	1029
76	874	883	892	900	909	917	926	934	942	950	958	966	974	982	989	997	1005	1012	1020	1027
77	873	882	890	899	907	916	924	932	940	948	956	964	972	980	988	995	1003	1011	1018	1025
78	871	880	889	897	906	914	922	930	939	947	955	963	971	978	986	994	1001	1009	1016	1024
79	870	879	887	896	904	912	921	929	937	945	953	961	969	977	984	992	999	1007	1015	1022
80	868	877	886	894	903	911	919	927	935	943	951	959	967	975	983	990	998	1005	1013	1020

Table 1.—Expected Calories in Twenty-four Hours. Males, 25 kg. to 34.5 kg.; 16 years to 80 years. (Females, subtract 10 per cent.)

35.0 35.5 36.0 36.5 37.0 37.5 38.0 38.5 39.0 39.5 40.0 40.5 41.0 41.5 42.0 42.5 43.0 43.5 44.0 44.5

16	1274	1283	1292	1301	1309	1318	1327	1336	1344	1353	1362	1370	1378	1387	1395	1403	1411	1420	1428	1436
17	1263	1272	1281	1290	1299	1308	1316	1325	1334	1342	1351	1359	1367	1376	1384	1392	1400	1409	1417	1425
18	1254	1263	1271	1280	1289	1298	1306	1315	1323	1332	1341	1349	1357	1365	1374	1382	1390	1398	1406	1414
19	1245	1254	1262	1271	1280	1289	1297	1306	1314	1322	1331	1339	1347	1355	1364	1372	1380	1388	1396	1404
20	1236	1245	1254	1262	1271	1280	1288	1297	1305	1313	1322	1330	1338	1346	1354	1362	1370	1378	1386	1394
21	1228	1237	1246	1254	1263	1271	1280	1288	1297	1305	1313	1321	1329	1337	1345	1353	1361	1369	1377	1385
22	1221	1229	1238	1247	1255	1263	1272	1280	1289	1297	1305	1313	1321	1329	1337	1345	1353	1361	1369	1377
23	1213	1222	1231	1239	1248	1256	1264	1273	1281	1289	1297	1305	1313	1321	1329	1337	1345	1353	1361	1369
24	1206	1215	1224	1232	1241	1249	1257	1266	1274	1282	1290	1298	1306	1314	1322	1330	1337	1345	1353	1361
25	1200	1209	1217	1225	1234	1242	1250	1259	1267	1275	1283	1291	1299	1307	1315	1322	1330	1338	1345	1353
26	1194	1202	1211	1219	1227	1236	1244	1252	1260	1268	1276	1284	1292	1300	1308	1315	1323	1331	1338	1346
27	1188	1196	1205	1213	1221	1230	1238	1246	1254	1262	1270	1278	1286	1293	1301	1309	1317	1324	1332	1339
28	1182	1190	1199	1207	1215	1224	1232	1240	1248	1256	1264	1272	1279	1287	1295	1302	1310	1318	1325	1333
29	1176	1185	1193	1201	1210	1218	1226	1234	1242	1250	1258	1266	1273	1281	1289	1296	1304	1312	1319	1327
30	1171	1179	1188	1196	1204	1212	1220	1228	1236	1244	1252	1260	1268	1275	1283	1291	1298	1306	1313	1321
31	1166	1174	1183	1191	1199	1207	1215	1223	1231	1239	1247	1254	1262	1270	1277	1285	1293	1300	1307	1315
32	1161	1169	1178	1186	1194	1202	1210	1218	1226	1234	1241	1249	1257	1264	1272	1280	1287	1294	1302	1309
33	1156	1165	1173	1181	1189	1197	1205	1213	1221	1229	1236	1244	1252	1259	1267	1274	1282	1289	1297	1304
34	1152	1160	1168	1176	1184	1192	1200	1208	1216	1224	1231	1239	1247	1254	1262	1269	1277	1284	1291	1299
35	1147	1156	1164	1172	1180	1188	1196	1203	1211	1219	1227	1234	1242	1249	1257	1264	1272	1279	1286	1293
36	1143	1151	1159	1167	1175	1183	1191	1199	1207	1214	1222	1230	1237	1245	1252	1260	1267	1274	1282	1289
37	1139	1147	1155	1163	1171	1179	1187	1195	1202	1210	1218	1225	1233	1240	1248	1255	1262	1270	1277	1284
38	1135	1143	1151	1159	1167	1175	1182	1190	1198	1206	1213	1221	1228	1236	1243	1251	1258	1265	1272	1280
39	1131	1139	1147	1155	1163	1171	1178	1186	1194	1201	1209	1217	1224	1232	1239	1246	1254	1261	1268	1275
40	1127	1135	1143	1151	1159	1167	1174	1182	1190	1197	1205	1212	1220	1227	1235	1242	1249	1257	1264	1271
41	1123	1131	1139	1147	1155	1163	1171	1178	1186	1193	1201	1208	1216	1223	1231	1238	1245	1252	1260	1267
42	1118	1126	1134	1142	1151	1159	1167	1175	1182	1190	1197	1205	1212	1219	1227	1234	1241	1248	1256	1263
43	1116	1124	1132	1140	1148	1156	1163	1171	1178	1186	1193	1201	1208	1216	1223	1230	1237	1245	1252	1259
44	1113	1121	1129	1137	1144	1152	1160	1167	1175	1182	1190	1197	1205	1212	1219	1226	1234	1241	1248	1255
45	1110	1118	1126	1133	1141	1149	1156	1164	1172	1179	1186	1194	1201	1208	1216	1223	1230	1237	1244	1251
46	1106	1114	1122	1130	1138	1146	1153	1160	1168	1175	1183	1190	1197	1204	1212	1219	1226	1233	1241	1247
47	1103	1111	1119	1127	1134	1142	1149	1157	1164	1172	1179	1187	1194	1201	1209	1216	1223	1230	1237	1244
48	1100	1108	1116	1123	1131	1139	1146	1154	1161	1169	1176	1183	1191	1198	1205	1212	1219	1226	1233	1240
49	1097	1105	1113	1120	1128	1136	1143	1151	1158	1165	1173	1180	1187	1194	1202	1209	1216	1223	1230	1237
50	1094	1102	1110	1117	1125	1133	1140	1147	1155	1162	1170	1177	1184	1191	1199	1206	1213	1220	1227	1234
51	1091	1099	1107	1114	1122	1130	1137	1144	1152	1159	1167	1174	1181	1188	1195	1202	1210	1217	1223	1230
52	1088	1096	1104	1111	1119	1127	1134	1142	1149	1156	1164	1171	1178	1185	1192	1199	1206	1213	1220	1227
53	1086	1093	1101	1109	1116	1124	1131	1139	1146	1153	1161	1168	1175	1182	1189	1196	1203	1210	1217	1224
54	1083	1091	1098	1106	1113	1121	1128	1136	1143	1150	1158	1165	1172	1179	1186	1193	1200	1207	1214	1221
55	1080	1088	1096	1103	1111	1118	1126	1133	1140	1148	1155	1162	1169	1176	1183	1190	1197	1204	1211	1218
56	1078	1085	1093	1101	1108	1116	1123	1130	1138	1145	1152	1159	1166	1173	1180	1187	1194	1201	1208	1215
57	1075	1083	1090	1098	1105	1113	1120	1128	1135	1142	1149	1157	1164	1171	1178	1185	1192	1199	1205	1212
58	1073	1080	1088	1095	1103	1110	1118	1125	1132	1140	1147	1154	1161	1168	1175	1182	1189	1196	1203	1209
59	1070	1078	1085	1093	1100	1108	1115	1122	1130	1137	1144	1151	1158	1165	1172	1179	1186	1193	1200	1207
60	1068	1075	1083	1090	1098	1105	1113	1120	1127	1134	1141	1148	1156	1163	1170	1177	1184	1190	1197	1204
61	1065	1073	1080	1088	1095	1103	1110	1118	1125	1132	1139	1146	1153	1160	1167	1174	1181	1188	1195	1201
62	1063	1071	1078	1086	1093	1100	1108	1115	1122	1129	1137	1144	1151	1158	1165	1172	1178	1185	1192	1199
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79	1290	1296	1302	1308	1314	1319	1325	1331	1336	1342	1348	1353	1359</							

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19	1822	1828	1834	1840	1846	1852	1858	1864	1870	1876	1882	1888	1894	1899	1905	1911	1917	1923	1928	1934
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66	1543	1549	1554	1559	1564	1569	1574	1579	1584	1589	1594	1599	1604	1609	1614	1619	1624	1628	1633	1638
67	1540	1545	1551	1556	1561	1566	1571	1576	1581	1586	1591	1596	1601	1606	1611	1615	1620	1625	1630	1635
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77	1512	1517	1522	1527	1532	1537	1542	1547	1552	1557	1562	1566	1571	1576	1581	1586	1591	1595	1600	1605
78	1509	1514	1519	1524	1529	1534	1539	1544	1549	1554	1559	1564	1569	1573	1578	1583	1588	1593	1597	1602
79	1507	1512	1517	1522	1527	1532	1537	1542	1546	1551	1556	1561	1566							

85.0 85.5 86.0 86.5 87.0 87.5 88.0 88.5 89.0 89.5 90.0 90.5 91.0 91.5 92.0 92.5 93.0 93.5 94.0 94.5

16	1985	1990	1996	2002	2008	2014	2019	2025	2031	2037	2042	2048	2054	2059	2065	2070	2076	2082	2087	2093
17	1969	1974	1980	1986	1992	1998	2003	2009	2015	2020	2026	2031	2037	2042	2048	2054	2059	2065	2070	2076
18	1954	1959	1965	1971	1977	1982	1988	1994	2000	2005	2011	2016	2022	2027	2033	2039	2044	2049	2055	2060
19	1940	1945	1951	1957	1963	1968	1974	1980	1985	1991	1996	2002	2007	2013	2018	2024	2029	2034	2040	2045
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21	1914	1920	1926	1931	1936	1942	1948	1953	1959	1964	1970	1975	1980	1986	1991	1997	2002	2007	2013	2018
22	1903	1908	1914	1919	1925	1930	1936	1941	1947	1952	1958	1963	1968	1974	1979	1985	1990	1995	2001	2006
23	1892	1897	1903	1908	1914	1919	1924	1930	1935	1940	1946	1952	1957	1962	1967	1973	1978	1983	1989	1994
24	1881	1886	1892	1897	1903	1908	1913	1919	1924	1929	1935	1941	1946	1951	1956	1962	1967	1972	1977	1983
25	1871	1876	1881	1887	1892	1897	1903	1908	1914	1919	1924	1930	1935	1940	1946	1951	1956	1961	1967	1972
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38	1769	1774	1779	1784	1789	1794	1799	1805	1810	1815	1820	1825	1830	1835	1840	1845	1850	1855	1860	1865
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41	1751	1756	1761	1766	1771	1776	1781	1786	1791	1796	1801	1806	1811	1816	1821	1826	1831	1836	1841	1846
42	1745	1750	1755	1760	1765	1771	1776	1781	1786	1791	1796	1801	1806	1811	1816	1821	1826	1831	1836	1841
43	1740	1745	1750	1755	1760	1765	1770	1775	1780	1785	1790	1795	1800	1805	1810	1815	1820	1825	1829	1834
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65	1646	1651	1656	1661	1665	1670	1675	1680	1684	1689	1694	1699	1703	1708	1713	1717	1722	1726	1731	1736
66	1643	1648	1653	1657	1662	1667	1672	1677	1681	1686	1691	1695	1700	1705	1709	1714	1719	1723	1728	1733
67	1640	1645	1649	1654	1659	1664	1668	1673	1678	1683	1687	1692	1697	1701	1706	1711	1715	1720	1725	1730
68	1637	1642	1646	1651	1656	1660	1665	1670	1675	1679	1684	1689	1693	1698	1703	1707	1712	1716	1721	1726
69	1634	1638	1643	1648	1652	1657	1662	1667	1671	1676	1681	1685	1690	1695	1699	1704	1708	1713	1718	1723
70	1630	1635	1640	1645	1649	1654	1659	1663	1668	1673	1677	1682	1687	1691	1696	1701	1705	1710	1715	1720
71	1627	1632	1637	1641	1646	1651	1656	1660	1665	1670	1674	1679	1684	1688	1693	1697	1702	1707	1711	1716
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79	1604	1609	1614	1618	1623	1628	1632	1637	1641	1646	1651	1655	166							

95.0 95.5 96.0 96.5 97.0 97.5 98.0 98.5 99.0 99.5 100 100.5 101 101.5 102 102.5 103 103.5 104 104.5

16	2098	2104	2109	2115	2120	2126	2131	2137	2142	2147	2153	2158	2163	2169	2174	2179	2185	2190	2196	2201
17	2081	2087	2092	2098	2103	2109	2114	2119	2125	2130	2135	2141	2146	2151	2157	2162	2167	2172	2178	2183
18	2066	2071	2076	2082	2087	2093	2098	2103	2109	2114	2119	2125	2130	2135	2140	2146	2151	2156	2162	2167
19	2051	2056	2061	2067	2072	2078	2083	2088	2093	2099	2104	2109	2115	2120	2125	2130	2135	2141	2146	2151
20	2037	2042	2047	2053	2058	2064	2069	2074	2079	2085	2090	2095	2100	2105	2111	2116	2121	2126	2131	2136
21	2023	2029	2034	2040	2045	2050	2055	2061	2066	2071	2076	2081	2086	2091	2097	2102	2107	2112	2117	2122
22	2011	2016	2022	2027	2032	2037	2042	2048	2053	2058	2063	2068	2073	2078	2084	2089	2094	2099	2104	2109
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66	1737	1742	1746	1751	1755	1760	1764	1769	1773	1778	1782	1787	1791	1795	1800	1804	1809	1813	1818	1822
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79	1696	1700	1705	1709	1714	1718	1722	1727	1731	1736	1740	1744	1749</							

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22	2114	2119	2124	2129	2134	2139	2144	2149	2154	2159	2164	2169	2174	2179	2184	2188	2193	2198	2203	2208
23	2102	2107	2112	2117	2122	2127	2131	2136	2141	2146	2151	2156	2161	2166	2171	2175	2180	2185	2190	2195
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26	2068	2073	2078	2082	2087	2092	2097	2102	2107	2112	2116	2121	2126	2131	2136	2140	2145	2150	2155	2159
27	2057	2062	2067	2072	2077	2082	2086	2091	2096	2101	2106	2110	2115	2120	2125	2129	2134	2139	2144	2148
28	2047	2052	2057	2062	2067	2072	2076	2081	2086	2091	2096	2100	2105	2110	2114	2119	2124	2129	2133	2138
29	2038	2042	2047	2052	2057	2062	2066	2071	2076	2081	2086	2090	2095	2100	2104	2109	2114	2119	2123	2128
30	2029	2033	2038	2043	2047	2052	2057	2062	2067	2072	2076	2081	2086	2090	2095	2100	2104	2109	2113	2118
31	2020	2024	2029	2034	2038	2043	2048	2053	2058	2063	2067	2072	2077	2081	2086	2091	2095	2100	2104	2109
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53	1880	1885	1889	1894	1898	1903	1907	1911	1916	1920	1925	1929	1933	1938	1942	1946	1951	1955	1959	1964
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66	1826	1830	1835	1839	1843	1848	1852	1856	1861	1865	1869	1873	1878	1882	1886	1890	1894	1899	1903	1907
67	1822	1827	1831	1835	1840	1844	1848	1853	1857	1861	1865	1870	1874	1878	1882	1886	1891	1895	1899	1903
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33	2096	2101	2105	2110	2114	2119	2123	2128	2132	2137	2141	2146	2150	2155	2159	2163	2168	2172	2177	2182
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73	1886	1890	1894	1898	1902	1906	1910	1914	1918	1922	1926	1930	1934	1938	1942	1946	1950	1954	1958	1962
74	1882	1886	1890	1894	1898	1902	1906	1910	1914	1918	1922	1926	1930	1934	1938	1942	1946	1950	1954	1958
75	1879	1883	1887	1891	1895	1899	1903	1907	1911	1915	1919	1923	1927	1931	1935	1939	1943	1947	1951	1955
76	1876	1880	1884	1888	1892	1896	1900	1904	1908	1912	1916	1920	1924	1928	1932	1936	1940	1944	1948	1952
77	1872	1876	1880	1884	1888	1892	1896	1900	1904	1908	1912	1916	1920	1924	1928	1932	1936	1940	1944	1948
78	1869	1873	1877	1881	1885	1889	1893	1897	1901	1905	1909	1913	1917	1921	1925	1929	1933	1937	1941	1945
79	1866	1870	1874	1878	1882	1886	1890</													

$$\begin{aligned} \text{Males, } W_{\lambda} &= 0.316\sqrt{0.38025\lambda} \\ &\quad \cdot W_{ch} = 0.305\sqrt{0.662Ch} \\ \text{Females, } W_{\lambda} &= 0.312\sqrt{0.36093\lambda} \\ &\quad W_{ch} = 0.284\sqrt{0.30213Ch} \end{aligned}$$

W_{λ} = Theoretic weight based upon trunk length.

λ = Trunk length measured as follows:⁵ (p. 5.) "It is taken with the subject sitting on the platform, the following points being carefully observed:

"The subject places the backs of the fingers upon the platform on which he sits, and, with the fingers pointing backwards and the knees flexed, lifts the lower portion of the body gently backwards until the lowest bony portion of the os sacrum is in contact with the front of the measuring standard. The back is then straightened until the back of the head comes into contact with the standard. It will be found that different persons require to bend the knees in different degrees in order to achieve this position. The head should be tilted neither up nor down, and the eyes should look straight forward. The measurement thus obtained gives the distance between the ischial tuberosities and the top of the head.

"If no proper measuring stand is available, fairly accurate readings can be obtained in the following manner. The subject should be seated on a level floor or a board, with his back against the perpendicular projecting angle of a wall or cupboard to which the scale is fixed. He should then proceed to seat himself in the manner indicated above. On account of the influence of the gluteal muscles, the trunk-length should not be taken when the subject is seated in a chair, as this affords measurements that are inconstant and that have been found to be as much as 3 per cent. greater than those taken by the correct procedure."

W_{ch} = Theoretic weight based upon chest circumference.

Ch = Chest circumference measured as follows:⁶ (p. 7.) "The circumference of the chest should be measured by a tape measure in direct contact with the skin (or, if necessary, placed over a very thin garment). The measurement is taken at the nipple-level in males, that is to say, at the level of the fourth intercostal space in the nipple line; in the case of females the measure is taken at the same level, just under the breasts. If the measurement in the case of females is taken at the same level over the breasts, it is found to be on the average $4\frac{1}{2}$ per cent. greater than if taken below the breasts. It is therefore necessary to subtract $4\frac{1}{2}$ per cent. from the chest measurement taken in this way, or, as an alternative method, multiply the observed measurement by 0.957, before looking up the corresponding weight in the tables.

"While being measured, the subject should stand up with the arms hanging loosely at the sides, and should be encouraged to talk; in this way quiet, natural breathing is secured, and expansion of the chest beyond the resting position is prevented. The measurement required is that of the normally breathing, *not expanded* chest."

The average of W_{ch} and W_{λ} is taken as the theoretic or expected weight of an individual of chest circumference Ch and sitting height λ .

On account of the difficulty of calculation of these formulas, Dreyer⁵ tabulates the values for the sitting heights and chest measurements usually encountered. However, for routine clinical determinations, the values, based upon actual weight and age, given in the tables accompanying this note are of sufficient accuracy.

These formulas of Dreyer have not found great favor, especially in this country, probably chiefly on account of the difficulty of calculating the values of the formulas, which involves the use of logarithms or of a logarithmic slide rule. It has been found much simpler to consult either the Harris and Benedict tables of values of their formulas, the tabulations of the Aub and DuBois "normals" in conjunction with the DuBois and DuBois height weight chart of body area, or the still simpler normal oxygen consumption values tabulated by the manufacturers of respiration apparatus.

Several series of determinations have been reported in which the basal metabolic rates were calculated, using both the Aub and DuBois "normals" and the expectation formulas of Harris and Benedict. These were referred to in the preceding note of this series. Among these are the series of (1) Boothby and Sandiford⁶ (p. 15), who report 404 comparative tests in which the rates by the Harris and Benedict method are 6.5 points above those by the Aub and DuBois method; (2) Boothby and Sandiford⁷ (p. 800), who report 455 comparative calculations substantially confirming the former series; Means and Woodwell⁸ (p. 641), who find 6 points deviation in the same direction; and (3) Stoner and Cowan,⁹ who find, in a series of 350 routine hospital determinations, that the Harris and Benedict standards yield results 3.0 per cent. above the Aub and DuBois "normals" and that the Dreyer formulas give rates 0.3 per cent. above those of Harris and Benedict.

Very few comparative series have been reported using the Dreyer expectation formulas, probably on account of the difficulty of calculation. With a view to minimizing the labor of calculation, there is presented herewith a tabulation of all values of Dreyer's formula for males between the ages sixteen and eighty years and between the weights twenty-five and one hundred and twenty-five kilograms in half kilograms. The values of the formulas for females are ten per cent., or one tenth, less than for males of the same weight and age. It is unnecessary to tabu-

late the values for females, as it is very simple, after a little practice, to deduct the ten per cent. by inspection. Possibly these tables may stimulate the use of these formulas so that accumulating data may give Dreyer's work its proper usefulness.

It should be borne in mind that, for children below the age of sixteen, the prediction values of Benedict¹⁰ and of Benedict and Talbot¹¹ are probably more accurate than the Dreyer formulas. It is for this reason that the accompanying tables do not give values for subjects under sixteen years of age.

Summary.—Dreyer's formulas for expected heat production based upon age and weight and for theoretic weight based upon sitting height and chest circumference are reviewed. Values of the formulas for expected heat production are tabulated for males, 16 to 80 years of age and from weights 25 to 125 kilograms.

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Medical Progress.

REPORT OF PROGRESS IN ORTHOPEDIC SURGERY.

BY M. N. SMITH-PETERSEN, M.D., BOSTON.

This report is based upon the 18th, 19th and 20th reports of progress as published in the *Archives of Surgery*. The general working outline will be the same as in the previous report.

CONGENITAL CONDITIONS.

Spina Bifida Occulta.—Diagnostic signs emphasized by different writers are: Foveola coccygea (present in 40 per cent. of all infants, but if it has not disappeared by the tenth or twelfth year, spina bifida will usually be found); hyper-

trichosis; club feet; and scoliosis. Cord involvement (sphincter disturbance and sensory changes) is present in a large per cent. of cases.

Symptoms often do not develop until after the age of nine, since this is the time when maximum skeletal growth takes place. Treatment should be undertaken early in order to be effective; we should bear in mind, however, that a great many of these cases never develop symptoms but are discovered accidentally.

Congenital Dislocation of the Hip.—Numerous writers describe their methods of gentle manipulation used in reduction. The underlying principle is essentially the same and is best described as a "push" rather than a "pull." Better results are reported than by the old more brutal method of reduction.

Fragilitas Ossium (Osteogenesis imperfecta).—Frontali¹ reports a typical case of fragilitas ossium in which the thymus gland showed both atrophy and sclerosis. The other glands of internal secretion were normal. He maintains that examination of the thymus ought to be made in all cases of this type.

Renal Dwarfism.—Barber² describes a form of interstitial nephritis in children which gives rise to dwarfism and bony deformities. The condition is not very noticeable until the age of 6 or 7 years. No treatment has been found to affect the condition.

TUBERCULOSIS.

Tuberculosis of Bone.—In an article reporting a microscopic study of specimens from fifty cases of bone tuberculosis, Allison³ discusses the variety of lesions observed in bones and neighboring tissues which result from one infective agent, the tubercle bacillus. The different character of these lesions Allison believes is due to the different reaction of different tissues. No instance in his series suggested primary synovial tuberculosis, the bone being the focus from which it extended in every case. He further states, "In all instances in this study in which tuberculous bone lesions were observed there was both bone destruction and bone proliferation. When cancellous bone was involved, destruction predominated. When compact bone was involved, proliferation predominated." Allison believes that all of the various changes observed are only the natural and usual reactions to infection of the special tissue involved. Certain of these tissues have the quality of quickly reacting to stimulation with proliferation while others show little or no tendency to react, and suffer destruction.

Serologic Tests in Surgical Tuberculosis.—Fried and Mozer⁴ believe that incipient syphilis and tuberculosis may be detected by serologic tests long before they are chemically manifest. In sixty-eight tuberculous children the tests were positive in more than 70 per cent. when the tuberculous process was of less than three

years' duration, but in only 30 per cent. when it had existed longer than this.

Treatment of Bone and Joint Tuberculosis.—The general attitude remains the same as expressed in the last progress.

DISEASES OF NUTRITION OR FAULTY METABOLISM.

Rickets.—There is so much material in the literature on the etiology and treatment of rickets it would be futile in a brief report to give an adequate résumé. The editor's note on rickets in the seventeenth report of progress adequately covers the situation: "The problem of rickets seems suddenly to be nearer solution than ever before. The restoration of the normal calcium phosphorus balance seems to be the essential chemical factor in bringing about a recovery, and various internal medications seem capable of restoring this balance. The striking curative effect which certain forms of radiation produce is quite startling."

INFLAMMATORY CONDITIONS.

Arthritis.—The same search for focus of infection, the same dietary restrictions as a year ago. In addition we find different authors emphasizing the value of hydrotherapy and physical exercise. Vaccine treatment at present seems to be in the background, but may occupy the center of the stage again as it has at various times in the past.

Osteomyelitis.—Starr⁵ well expresses the present tendency in the treatment of acute osteomyelitis. It should consist in incision over the area of greatest tenderness if pus is encountered under the periosteum. Starr considers this incision sufficient and inserts a drain. If no pus is encountered a series of drill holes is made into the medullary canal. In no case has he opened the medullary cavity; he considers it a dangerous procedure.

STATICS OR BODY MECHANICS.

Posture.—The relation of bodily mechanics to cyclic vomiting and other obscure intestinal conditions has been studied by Talbot and Brown.⁶ They find that vicious habitual postures inhibit normal intestinal function and induce constipation both in children and adults. Certain cases of cyclic vomiting, supposed generally to be due to some fault of innervation, have yielded rather strikingly to correction of the posture by means of exercises and braces. Swaim⁷ feels that restoration of normal body mechanics may turn the scale favorably in cases of chronic arthritis.

PARALYSIS.

Anterior Poliomyelitis—Communicability and Serum-Treatment of Poliomyelitis.—Amoss,⁸

summarizes the work of the Rockefeller Laboratory as follows:

Distribution of the Virus in the Host.—The virus has been found in neither the cerebrospinal fluid nor in the blood of human subjects, but has been found in both, in monkeys. The virus has been found in the nasal washings of both human and monkey cases. The definite time of disappearance has not been determined. There is doubt concerning the virus in the stools.

Route of Infection.—It appears that the virus is transferred by chance, either directly or indirectly, from the nasal mucous membrane of the host to the nasal mucosa of the susceptible new host. It is propagated in the central nervous tissues of the host, but does not survive external conditions of mediation.

Defense Mechanism.—The nasal washings of healthy adults, but not of children, neutralize the virus. In monkeys large doses intravenously rarely cause infection. It has been observed that a positive Schick test in poliomyelitic children is present twice as often as the expected occurrence in children of the same age in the general population.

Carriers.—The virus seems to have a greater chance of surviving in the nasal secretions of a carrier than in the recovered case. Healthy carriers have been demonstrated.

Communicability.—The stage of communicability is from one week before to two weeks after the onset.

Prevention.—In Vermont the patient and the intimate contacts are quarantined for three weeks.

Treatment.—Since the lesion is tucked away in the most remote and inaccessible parts of the body, treatment is a difficult art. Serum from recently recovered cases is recommended, as it is believed to have a greater antibody content. The serum for intraspinal injection must be free from particles and hemoglobin. The results from serum treatment seem to show definitely when analyzed that the disease is arrested in cases treated within forty-eight hours after the onset with more than 50 c.c. of the serum.

Diagnosis, Prognosis, and Early Treatment of Poliomyelitis.—Dr. Lovett⁹ writes an article of great value emphasizing the following points: 1. Diagnosis should be made on the basis of physical examination rather than on the history. 2. Tenderness is a guide of great importance in diagnosis, prognosis, and treatment. 3. Early treatment consists of rest. 4. In the convalescent stage, muscle fatigue is our chief danger, and muscle re-education our chief reliance. 5. Deformities prevent proper function and favor muscular deterioration.

SCOLIOSIS.

The etiology of scoliosis remains unsettled. Hibbs feels that a great many cases result from infantile paralysis though as yet he has been un-

able to prove his theory. Congenital deformity, anatomical variations, trauma to epiphyses, all are possible etiologic factors, but even so we still have a great number of cases which come under the heading of "idiopathic scoliosis."

Treatment.—Operative and non-operative. In children the non-operative treatment seems the more logical procedure in the majority of cases. Klein¹⁰ states that the aim of treatment should be "to improve the symmetry of the severe scoliotic, so that after the maximum amount of correction has been obtained the muscles may become, with proper training, adequate to compensate for the remaining deformity." On this principle his treatment is based. Corrective plaster jackets interrupted by exercise treatment avoiding thereby any considerable muscular atrophy.—In cases of scoliosis resulting from poliomyelitis, and in a certain number of "idiopathic cases" Hibbs performs fusion operations; he achieves excellent permanent improvement in the great majority of his cases.

NEOPLASMS.

Codman¹¹ explains the working and future plans of the registry of cases of bone sarcoma and asks the cooperation of all surgeons. The cases thus far registered fall into four groups:

1. Malignant osteogenic sarcoma.
2. Benign giant-cell tumors.
3. Rare forms of primary bone tumors.
4. Errors in diagnosis.

The Registry has had correspondence or has actually observed, 454 cases. Of this number, it has been obliged to exclude for lack of roentgen-ray examination, or lack of microscopic section and gross tissue, or because the diagnosis was obviously incorrect, 317 cases. There remained forty-one cases of osteogenic sarcoma, forty-three cases of giant-cell tumor and fifty-three cases were considered undetermined. In only five cases of osteogenic sarcoma are the patients known to be alive five years after the operation.

Bloodgood¹² suggests the following working rule for the diagnosis and treatment of tumors of bone. If a patient is under 15 years, we can exclude sarcoma, and the diagnosis rests between the common bone cyst, the less frequent giant-cell tumor, and the rare chondromyxoma. The most common central lesion of bone is the benign bone cyst. In the majority of cases they recover without treatment. The second is the giant-cell tumor which predominates in patients over 15. Myxoma may occur at any age from birth to death.

TENDON SURGERY.

Starr's¹³ conclusions from a study of the end-results of fifty-two operations of tendon transfer which he has performed for the relief of war injuries, chiefly in irreparable nerve in-

juries in the arm, are valuable: 1. So far as possible, muscles having similar action to the ones they are to replace should be employed. 2. If only a portion of a muscle is to be employed, it must have the same action as the muscle it is to replace. 3. The line of pull should be as straight as possible. 4. The fixation of the muscle should be made with a good deal of tension. 5. Bony deformity, due to contraction of tissues, should be overcome before the transfer of muscles is attempted. 6. Tendons should run in fatty subcutaneous tissue rather than in the sheath of other muscles. 7. In the lower extremity, transferred tendons should be inserted into bone or periosteum; in the upper extremity, they may safely be attached to paralyzed tendons. 8. Linen thread is the best material for suture, and the fixation of tendon to tendon must be adequate. 9. Immobilization for three weeks should be the rule and then muscle training begun.

PERIPHERAL NERVE LESIONS.

Platt¹⁴ after a very wide experience in the surgery of peripheral nerve lesions, advocates: 1. The most ample anatomic exposure from the beginning of the operation, as a routine; 2. the constant employment of direct electrical stimulation by means of the bipolar electrode; 3. the standardization of those positions of the patient and the limb on the operating table which will minimize the difficulties of accomplishing end-to-end suture without undue tension.

Platt has followed the end-results of 248 cases. One hundred and fifty of these were end-to-end sutures. Seventy-nine per cent. presented varying degrees of recovery; twenty-one per cent. were complete failures. The influences which inhibit the success of the operative procedure are: 1. The period since injury, progressively inferior results being seen with increasing delay. 2. Infection, which delays regeneration. 3. The nature of the nerve bed, which is almost negligible unless the nerve trunk is subjected to bony friction. 4. The topography of the nerve, accounting for many failures. 5. Level of suture, regeneration in the distal part of the limb being likely to be fickle. Eighty operations of neurolysis were performed, with 75 per cent. of recoveries or improvements. Eighteen operations of nerve bridging were performed and they were all complete failures.

FRACTURES.

A great step was taken in April, 1922, when a group of general surgeons and orthopedic surgeons met and decided upon a syllabus for Treatment of Fractures. This was published in *Archives of Surgery*, January, 1923; and to this I refer all interested in the treatment of fractures.

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Book Reviews.

Translation of Selected Passages from De l'Auscultation Mediate. (First edition.) By R. THÉOPHILE H. LAENNEC. With a biography by Sir William Hale-White, K.B.E., M.D. Medical Classics Series, New York: William Wood and Co. 1923.

The selected passages from Laennec's great work, together with the most interesting biography by Hale-White form a valuable and timely addition to the Medical Classics Series.

Most American physicians, if asked who Laennec was, would probably answer that he was a Frenchman who invented the stethoscope about one hundred years ago, and beyond this bare fact nothing would be known of one of the very greatest figures of medical history. This little book will give no excuse for such a state of affairs to remain. The short biography of Laennec is admirable, and gives a keen insight into the trials and tribulations of the young medical student.

The translation excerpts are divided into seven chapters, dealing with investigation of the voice, in general, and taking up the auscultatory signs of phthisis at length, peripneumonia, pleurisy, pneumothorax, edema of the lung, and pulmonary apoplexy. It is seldom that one finds a translation from the French so perfectly done that one feels that nothing is lost by the translation, but this is true of this work.

How Laennec first worked out the great discovery is told in the Introduction, so admirably translated as follows: "In 1815 I was consulted by a young woman, presenting general symptoms of disease of the heart. Owing to her stoutness little information could be gathered by the application of the hand and percussion. The patient's age and sex did not permit me to resort to the kind of examination I have just described, i.e., direct application of the ear to chest. I recalled a well-known acoustic phe-

nomenon, namely, if you place your ear against one end of a wooden beam the scratch of a pin at the other extremity is most distinctly audible. It occurred to me that this physical property might serve a useful purpose in the case with which I was then dealing. Taking a sheaf of paper I rolled it into a very tight roll, one end of which I placed over the precordial region, whilst I put my ear to the other. I was both surprised and gratified at being able to hear the beating of the heart with much greater clearness and distinctness than I had ever done before by the application of my ear."

It is of interest to note that Laennec's first publication was the description of a case of mitral disease, written when he was twenty-one years of age.

Few, indeed, would know that it was Laennec who first described the subdeltoid bursa, writing in 1803, and that in 1804 he read a paper on hydatid cysts, in which he showed that the cysts were due to a parasite.

The desperate struggle to keep up his work in later years, against the fearful odds of his progress in tuberculosis, are graphically described in the biography. The pages closed, we marvel at the indomitable courage displayed by this great physician.

One cannot imagine a more valuable book than this to put into the hands of the student or physician, for pleasure, instruction, and inspiration.

The Infant and Young Child: Its Care and Feeding from Birth until School Age. A Manual for Mothers. By JOHN LOVETT MORSE, A.M., M.D., Professor of Pediatrics, Emeritus, Harvard Medical School, Consulting Physician at the Floating, the Children's, and the Infants' Hospitals, Boston; EDWIN T. WYMAN, M.D., Instructor in Pediatrics, Harvard Medical School, Visiting Physician at the Floating Hospital, Assistant Physician at the Children's Hospital, Boston; and LEWIS WEBB HILL, M.D., Assistant in Pediatrics, Harvard Medical School, Junior Assistant Physician at the Children's Hospital, Visiting Physician at the Nursery for Blind Babies, Boston. Philadelphia and London: W. B. Saunders Company. 1923.

Drs. Morse, Wyman and Hill have added to the list of manuals for mothers a rather longer book than many, but one well deserving of taking a leading place in the ranks of books of this type. The authors go into considerable detail in outlining the care of the baby and apparently omit no points on which instruction should be given.

As is to be expected, the short feeding interval is advocated and the percentage method of compounding formulas with skim milk and

cream is the only one tolerated. Varied feeding is instituted late, green vegetables not being allowed during the first two years. Most authorities will now disagree with these recommendations.

Chapters are given over to feeding disorders in the artificially fed infant and in young children which perhaps go into unnecessary detail for a book supposed to be designed primarily for mothers. Many excellent feeding recipes are published. The section on Care and Training is by far the best part of the book, and might with profit be studied by physicians who would decidedly differ from the authors in their feeding methods.

The percentage feeding method, the short feeding interval and the restricted diet are the foundation stones on which the Boston school of infant feeding has been built and successfully conducted. Many pediatricians, however, have with equal success adopted less complicated and more liberal principles, the propriety of which the present authors do not recognize.

Nosography in Modern Internal Medicine. By KNUT FABER, M.D., Professor of Internal Medicine, University of Copenhagen. New York: Paul Hoeber, Inc. 1923. Price, \$3.75 net.

With engaging clarity and directness this well-printed and becomingly dressed volume of 222 pages recites the history of the descriptive method as applied to clinical manifestations of internal pathologic processes. The recital embraces the period from Sydenham's time to our own, and is as fascinating as a romance. In it figure men whose performances we regard as epoch-making in the evolution of medical science in England, Scotland, Ireland, France, Denmark, Sweden, and Germany.

With admirable impartiality, Dr. Faber estimates the relative values of the nosologic notions of this outstanding group, and shows that they were colored not only by the existing status of medical science, but by racial habit of thought as well.

At no point throughout the narrative does interest for a moment flag. One follows with enthusiasm the struggle toward the light. And even where the nosographic ideas evolved were most highly speculative and fanciful, one cannot help admiring the tremendous force of the personalities which caused them to prevail, at least for a time, throughout the medical world.

"*Nosography in Modern Internal Medicine*" should be widely read and pondered by medical students. Incidentally, its careful perusal by clinical instructors will do no harm. In addition to the text, there are twenty-one full-page portraits. An introductory note by Dr. Rufus Cole,

Director of Hospital, Rockefeller Institute, expresses warm conviction of the book's power to inspire and to charm.

Duff House Papers. Volume I. Edited by EDMUND I. SPRIGGS, M.D., F.R.C.P. Oxford Medical Publications. London: Henry Frowde and Hodder & Stoughton. 1923. Illustrated. Pp. 370.

In this first volume of papers from Duff House, edited for its several contributors by the Senior Physician of Duff House, Banff, there is presented in attractive and well illustrated form a selection of the more important papers which have issued from Duff House from the time of its opening in September, 1913, to November, 1922. The most important of the new papers not previously printed in medical journals are "The Patient's Manual of Diabetes," and an account of the "Routine of Radiographic Examination of the Alimentary Tract, with Especial Reference to the Stomach and Duodenum."

"The Patient's Manual of Diabetes," the greater part of which is written by Spriggs himself, is an excellent and very detailed monograph of some eighty pages, well illustrated, and subdivided into twenty brief chapters. This Manual, being printed as a separate volume, is available to give to suitable patients for their home use. Its unusual completeness should recommend it to the physician as well as to the patient himself.

The account by Marxer of the technique used for radiographic examination of the alimentary tract is clear and interesting, yet it introduces no marked variations from accepted practice. The barium enema, however, long accepted as an indispensable part of any complete routine investigation of the colon, seems reserved for use "whenever a part of the colon, usually the pelvic colon, has not been entirely seen during the transit of the food." In connection with the use of the barium enema, it is also stated that "when all the material has entered, a screen examination is made"; from which it is inferred that Marxer does not observe the inflow of the barium mixture into the pelvic and upper colon, whereby he misses a most instructive part of this procedure, with which only the later observation of the outflow of the barium mixture can be compared for interest and value as an opportunity to follow the colon in active peristalsis and anti-peristalsis.

Of the other articles, previously published elsewhere, that "On Dropping of the Stomach," by Conran, deserves mention as a sane presentation of the medical aspects of the etiology and treatment of gastroparesis, carefully studied radiographically and otherwise, in a selected series of 150 out of a total of 684 gastro-intestinal patients.

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Established in 1828

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Communications should be addressed to The Boston Medical and Surgical Journal, 126 Massachusetts Ave., Boston, Mass.

ENCEPHALITIS IN THIS VICINITY.

IN the BOSTON MEDICAL AND SURGICAL JOURNAL of August 2, 1923, there were reported five cases of encephalitis seen at the Children's and Infants' Hospitals. Since then one other case has been admitted to the Infants' Hospital. This case was similar in all respects to those reported last week and ended fatally. Although this was only a preliminary report, the striking similarities in the symptoms, the physical findings, the course, and the outcome in all six cases would seem to call for special consideration. The medical profession should be aware of the fact that such cases have appeared, and they should be on the lookout for similar cases in their practices. None of the cases thus far described have recovered, but it is not unlikely that milder instances of the condition have occurred and have been unrecognized.

If all these children have suffered from a distinct disease entity, as is not unlikely, it would help greatly in securing additional knowledge of the condition if all cases could be reported. It is also important for post-mortem examinations to be made in all fatal cases. Comparative pathological studies and bacteriological in-

vestigations are the means by which it may be possible to determine the etiological agent. More knowledge is greatly needed. The lay public should be given the facts so far as they are known at the present time. It is much better for this information to come from physicians than from the newspapers. A further report will be made after the studies of these six cases have been completed.

PRIZE FOR HEALTH WORK.

THE American Public Health Association will make an annual award to the city of one hundred thousand population or over that can show the most nearly adequate community health service by January, 1924, and the most progress after that date, according to statements made in the daily papers.

The committee, consisting of Prof. C. E. A. Winslow of Yale, Dr. Donald B. Armstrong, Professors Freeman and Frost of Johns Hopkins, and Dr. L. R. Thompson of the U. S. P. H. S. will have the matter in charge. The U. S. P. H. S. and the Metropolitan Life Insurance Company will cooperate.

Massachusetts cities should be in the running.

THE QUARTERLY BULLETIN OF THE VERMONT STATE MEDICAL SOCIETY.

THIS bulletin for April and July, 1923, contains an account of the annual meeting of this Society. In addition to the scientific features of the meeting, the report of the speech of Dr. Merrill of Pittsfield, a delegate from the Massachusetts Medical Society, is of interest because, after the desirability of having meetings from time to time that would bring together the doctors of New England was advocated, several of the Vermont men spoke in favor of such conventions. The expressions of approval which have been submitted by physicians in the several New England States indicates the probability of the holding of a meeting of this character in the near future. After a trial of the plan the wisdom of a repetition can be further considered.

The discussion of the functions of the State Society by Dr. Olin West, Field Secretary of the American Medical Association, as it appears in this bulletin is interesting and could be read with profit by all of the younger members of the profession and many of the older ones, for the purposes and ethics of medical societies were well presented. His brief criticism of the teaching in the medical schools is very well expressed. A copy of this bulletin can be secured by addressing Dr. W. G. Ricker, St. Johnsbury, Vermont.

ANNUAL REPORT OF THE BOARD OF HEALTH OF PORTLAND, MAINE, FOR 1922.

THE Board of Health of Portland in January, 1922, voted to affiliate with the New England City and Town Council to promote the enforcement of sanitary regulation of dairy farms and creameries.

Although antitoxin is not made and supplied gratuitously by the State of Maine, it was supplied free by the city to all needy cases, and it is believed that this largely accounts for the comparatively low fatality rate from diphtheria. The use of toxin-antitoxin was encouraged, but no reports were available to show the extent of its use.

The exceptionally high cancer mortality of Portland is mentioned, the only possible reason given being the excess female population, particularly in the more advanced age groups. A careful cancer survey is recommended.

Three hundred and forty-five diphtheria carriers were found and isolated; one of these was cleared up after a shoe button had been found in the upper nasal passages by x-ray and extracted.

This report shows, on the whole, up-to-date health work being conducted in Portland, except for the lack of a comprehensive diphtheria prevention program.

EXPERIMENTS ON PASTEURIZATION.

DR. W. H. PARK, Director, Bureau of Laboratories, New York City Department of Health, has published in his report the results of experiments conducted by the department on the commercial pasteurization of milk.

In milk heavily infected with typhoid bacilli, some organisms survived even an hour's pasteurization at 130°F. At 142°F.-145°F., however, all were killed in four to eight minutes. Typhoid, paratyphoid, diphtheria bacilli, and streptococci were destroyed within ten minutes at temperatures ranging from 140°F.-145°F. Milk was also inoculated with both human and bovine tubercle bacilli, and, although some survived ten minutes' heating at the above temperatures, all were destroyed after twenty minutes.

Some of the positive results were found to be due to faulty construction of the tanks which were tested.

The results of these tests, and the faults found, while they further convince us that efficient pasteurization destroys disease germs in milk, raises the old question—How do we know when milk is efficiently pasteurized?

WHAT AMERICAN MEDICAL AID IS DOING IN RUSSIA.

PLANS FOR WORK OF COMING YEAR.

PLANS for the coming year's medical work of the Friends' Relief Mission in Russia have recently been completed. This work is supported by the American Friends Service Committee, 20 South 12th Street, Philadelphia, through its medical section: American Medical Aid for Russia. Local and state branches of the latter have been organized by medical leaders in many parts of the United States.

The new plans for the work on the field were drawn up by Dr. Elsie Graff, head of the Mission's Medical Department, in conjunction with the medical authorities in Moscow.

Dr. Graff feels that all the plans of the Narcomzdrav (Commissariat of Public Health) are thoroughgoing and up to date, that they have as comprehensive an understanding of the needs and necessary remedies as can be found in any country in the world.

The first division of the medical program of the Mission, and one that can be carried out at once, is assistance to hospitals, already existing, in equipment and repair, in supplying sheets and blankets, medicines, etc. Most of the hospitals in the district have had only a negligible amount of medicines, and almost none of the most simple kind of equipment, such as thermometers, hot water bags, and other necessary things.

The second point is the continuing and enlarging of the present anti-malaria work. At the present time there are two clinics, one in Srochinskoye and one in Buzuluk, each of which has up to the present time received over 7000 persons for blood tests and quinine treatment, and each of which is taking in new patients at the rate of 100 a day. The only limitation to this work has been the lack of quinine, but the new program provides for enough quinine to continue these clinics and open new clinics in the outlying districts. In connection with this work, an engineer is to be secured through the government, and plans will be made to drain the stagnant water that lies around most of the villages, where the malarial mosquitoes breed.

The third point is the Child Welfare work. As a first step in this comes the government's program of reducing the number of children in children's homes to an absolute minimum, so that as much energy as possible may be concentrated on keeping the general population in health. To help accomplish this it is proposed to open day-nurseries in the villages in the summertime so that there may be some care for the very young children while their mothers are working in the fields and gardens. The latter are usually far away from the house, so that

many of the peasant children are neglected all through the day. It is also proposed to open children's consultation and pre-natal clinics so that there may be special medical care for children outside of institutions, and advice and help given to nursing and expectant mothers. Wherever necessary, it is proposed to give special food relief to widows without resources and with more than one child. Increased medical inspection in institutions and schools will also be necessary. In addition to aiding any institutions already existing to the limit of the Mission's capacity, it is proposed to open additional institutions for delicate and defective children, such as summer homes for vacation purposes, institutions for tuberculosis, orthopedic, and mental defectives.

And finally—in preventive and educational work among the children—it is suggested that there be a general nutrition campaign in all closed institutions, or wherever full diet is possible; that posters, cards, songs, verses, etc., be used, and that the children themselves be employed in a general health campaign such as "Clean Up Week," "Anti-Malarial Work," "Swat the Fly," contests, etc.

The final point in the program is assistance in the struggle against venereal diseases.

This, in outline, is the plan submitted for the future medical work of the Friends, with the full approval of the Health Department of the government. Dr. Graff received a great deal of help in Moscow from the medical authorities, particularly from Dr. Lebedeva, who is in charge of the Mothers and Babies' Division, and who is working herself to death in her efforts to put into effect some of the splendid plans of her department for the protection of the coming generation.

VENEREAL DISEASE INFORMATION.

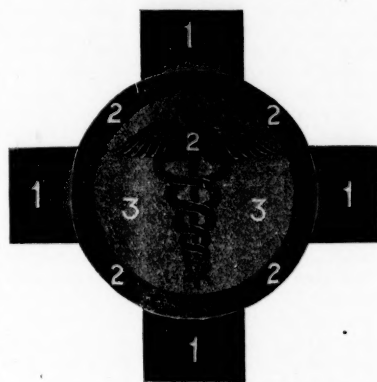
THOSE members of the medical profession who come in contact in any way with venereal disease should have brought to their attention the pamphlet called "Venereal Disease Information," published monthly by the Division of Venereal Diseases of the U. S. Public Health Service. This pamphlet may be subscribed to at a nominal cost. It aims to review and abstract all the literature appearing in the current medical journals which bears upon any aspect of this most important subject.

THE CADUCEUS.

DR. GEORGE E. PERKINS of 536 Commonwealth Avenue, desires to present a plan for the adoption of the caduceus which seems to be appropriate. The retention of the underlying green cross would indicate to practically every-

body the fact that the emblem conveys the information that the exhibitor is a physician. The superimposed caduceus meets the desire of those who wish to have this specific designation perpetuated. If the Legislature in its wisdom will enact a law prohibiting the exhibition of the caduceus by any person who is not registered as a physician something may be accomplished toward eliminating the use of an emblem as a cover for irregularities of behavior.

This double emblem may meet the wishes of the profession.



Colors represented by the figures are as follows: 1, green; 2, gilt; 3, background.

If some arrangement could be devised for numbering the emblems, and this number made a matter of record, the use by an unauthorized person would be an added safeguard.

DR. GEORGE B. MAGRATH'S ILLNESS.

SUFFERING from a severe type of septicemia contracted in connection with his work, Dr. Magrath, senior medical examiner for Suffolk County, has been fighting for his life at the Massachusetts General Hospital. Late reports indicate that the battle has been won and Dr. Magrath will regain the use of his left hand, which was the port of entry of the sepsis.

The profession will feel relieved to know that this scientist will be able to carry on his work, and the Commonwealth should be congratulated on the prospect of his continued service.

Have you subscribed for the History of the Massachusetts Medical Society? If not, cut out the blank in our advertising column, page v, fill in, and forward.

Miscellany.

NOTES FROM THE BOSTON MEDICAL LIBRARY.

THE library has obtained a copy of the "Miniaturen der lateinischen Galenos Handschrift der Kgl. Oeffentl. Bibliothek in Dresden." Edited by E. C. Van Leersum and W. Martin and published at Leyden in 1910. It is a photographic reproduction of the miniatures (116 in all) from probably the most important extant illustrated medical manuscript in the possession of the public library of Dresden, Germany. Accompanying the plates is a full description and explanation of each miniature.

An interesting and important historical acquisition is the secretary's copy of the original issue of the "Rules and Regulations of the Boston Medical Association." Twenty-five copies were printed early in 1806 and every member of the Association was supplied with a copy signed by every other member who agreed to the regulations. The present copy was signed in 1806 by the following original members: James Lloyd, the first chairman, Samuel Danforth, Isaac Rand, Lem. Hayward, John Jeffries, Thos. Kast, John Warren, Thomas Welsh, William Ingalls, Thomas Danforth, Asa Bullard, James Jackson, Jacob Gates, Ben Shurtleff, John C. Howard, J. C. Warren, Cyrus Perkins, Horace Bean, Aaron Dexter, Wm. Spooner, John Fleet (the first secretary), John Gorham, John Randall and T. I. Parker. Later, during 1807-1810, the following signatures were added: D. Newcomb, Daniel Adams, Geo. C. Shattuck, Jacob Bigelow, J. B. Brown, Dan'l Cook, Joseph W. Lowell, Oliver Sears, Nath'l Bemis and Benjamin James.

The physicians of Boston met at Vila's on January 24, 1806, for the purpose of considering the adoption of a uniform fee table. Dr. James Lloyd was chosen chairman and Dr. John Fleet, secretary. A committee of seven was appointed to draw up a fee table and regulations. At a later meeting held on February 11, 1806, the committee made its report and a fee table was adopted, to go into effect on March 1, 1806.

It was voted "that no physician shall omit charging all necessary visits an account of the number made in one day"; that every member be supplied with a copy of the regulations signed by every other member agreeing to the regulations and fee table, and that there shall be an annual meeting to be held in March of each year.

A single visit was to be charged at \$1.50; a consultation, \$5; a visit at night, \$5; out of town, \$1.50 per mile from the center of the town; obstetrics, day \$12; night, \$15; ordinary advice at the physician's house, \$1; extra advice, \$5 to \$10, according to its importance; capital

operations, \$40; minor operations, \$5 to \$10; venesection, \$1; vaccine inoculation, \$5; gonorrhea, \$10; syphilis, \$15.

At the annual meeting held on the first Wednesday in March, 1807, it was voted to appoint a standing committee of three members. The duties of this committee were to advise and direct the secretary in the admission of new members to the Association and to attend to all matters which concerned the honor and interest of the Association. They were specifically requested to prepare a code of medical police to be submitted to the Association at its next annual meeting; Drs. Warren, Hayward and Fleet were chosen for the standing committee.

At this meeting it was voted "That no member of this Association shall hereafter consult with any practitioner in this Town, who is not a member of the said Association." At the meeting held in Boston during March, 1808, the standing committee reported the first "Boston Medical Police" or a code of ethics, which was accepted by the Association. It was voted to print 500 copies, each member to receive three copies, the remainder to be distributed to other physicians of the State.

This first code had to do with the ethics of consultations, interferences, differences between physicians, quackery, conduct, fees, offices, and rights of seniority. The report is signed by John Warren, Lemuel Hayward, and John Fleet.

In 1809 it was voted by the Association that in case any member of the Association becomes acquainted with the conduct of another member, which he considers as a breach of the rules and regulations of the Association, it shall be his duty to make the same known to the standing committee, who shall take action. It was also voted that in the future it be contrary to the rules and regulations of this Association for any member to make a previous contract with any family for a definite sum as a remuneration for his annual attendance on that family.

UNPLEASANT EXPERIENCES OF PROFESSOR PAVLOV.

DR. IVAN PETROVITCH PAVLOV and his son, Professor Vladimir Pavlov (sometimes written Pawlow) have left this country after a three weeks' visit.

His name has been prominently mentioned in this country because of his studies on gastric digestion by means of an artificial pouch made in the wall of the stomach of a dog. Among scientists he is regarded as one of the greatest of living physiologists. In his Petrograd laboratories thirty doctors and other helpers are at work under his direction.

While on a train in the Grand Central Ter-

minal, New York, he was robbed of \$2000 and was obliged to seek the hospitality of the Rockefeller Institute. When about to sail he was refused a British visé to his passport because of his nationality, and had to secure a French visé. The delay prevented his attendance at the Edinburgh Congress of Physiologists. It is unfortunate that this eminent scientist should have unpleasant recollections of his visit to this country.

SAVING THE BABIES.

CITIZENS who live in communities apathetic to their infant death rate should consider carefully the results of the coöperative rural health work now being carried on in Green County, Missouri. A report just received by the United States Public Health Service at Washington shows a remarkable reduction in the infant mortality rate in Springfield and Campbell townships since the establishment there of a whole-time county health department.

In 1918 the death rate in these two Missouri townships was 105 per thousand. That is, out of every 1000 babies born alive, 105 died in that year. Then Green County decided it could no longer afford to continue unmindful of its baby death rate, and a health department was organized.

In the following year, 1919, the infant death rate in these two townships dropped to 96 per thousand. In 1920 it went to 85, in 1921 to 76, and in 1922 the decline reached 61. In other words, Springfield and Campbell townships reduced their infant mortality rate 42 per cent. within the short space of four years.

This 42 per cent. reduction furnishes a striking example of what may be accomplished in infant welfare by carrying out, with economy and efficiency, a well-balanced general program of health work affecting all age-sex groups in a community with a well-administered health department under the direction of a whole-time health officer.

The example of Missouri in saving its babies should be followed by other communities not equipped with health departments or health officers giving their full time to the work. It is time for the thinking men and women who live in such communities to organize; time for them to shake off their indifference, and set about earnestly to save the lives of babies born in such communities. A county health department under the direction of a full-time health officer is the first objective. Missouri is showing the way.

MALARIA IN RUSSIA.

The spread of malaria in Russia has reached catastrophic proportions. It is on the increase at the present time, according to the latest reports received by the American Friends Service Committee from its workers in Russia, and is sapping the strength of great masses of the population.

According to the figures of the Epidemic Subdivision of the Department of Public Health at Moscow, there were in June 96,690 cases in Buzuluk Ooyezd, and 49,690 cases in Pugachev Ooyezd. Owing to the insufficient number of medical establishments, however, and to the lack of quinine, large numbers cannot be treated, and the registration of cases is very incomplete. The Friends' workers state that as much as 80 per cent. of the entire population is affected in many parts of their district.

The Friends' workers have been carrying on anti-malarial work in Buzuluk Ooyezd for the past six months. They are now making it one of the most important divisions of their program, as neither the local nor the central government can cope with the situation. American support for this work is being received by the American Friends Service Committee through its Medical Section. The latter, which is known as American Medical Aid for Russia, has its headquarters at 20 South 12th Street, Philadelphia, Pa., with state and local branches in different parts of the country.

PHYSICAL EXAMINATIONS AT THE BOSTON HEALTH SHOW.

A meeting was held at the Boston Medical Library on Friday, August 3, at which were present representatives of the Massachusetts Medical Society, Norfolk District Medical Society, Middlesex South District Medical Society, Homeopathic Medical Society, Suffolk District Medical Society, as well as representatives of the Boston Health Department, The Boston Dispensary, The New England Hospital for Women and Children, The Massachusetts Homeopathic Hospital, the Massachusetts Eye and Ear Infirmary, the Huntington Hospital and the Board of Control of the Health Show. It was the unanimous opinion of those present that any public demonstration of physical examinations was unwise. Regardless of the value of physical examinations in the detection of disease, it was felt that the subject was one which never could lend itself to public demonstration. The relation between physician and patient must be so largely one of personal confidence and the physical examination must be so private that any public demonstration would be misleading, incomplete and unsatisfactory to both the physician and patient. The medical profession, it was felt,

would be open to criticism if they endorsed examinations which necessarily would be unsatisfactory. It was deemed unwise to advocate the bringing of infants and children into crowded halls for the purpose of making physical examinations. There was no opposition to any other means (than public demonstrations) which would promote the making of physical examinations as a health measure.

CARBON MONOXIDE IN TOBACCO SMOKE.

Washington, D. C.—The much mooted question as to whether the carbon monoxide present in tobacco smoke constitutes a hazard to the smoker in confined indoor spaces seems to have been settled as a result of tests just completed by the Department of the Interior at the experiment station of the Bureau of Mines at Pittsburgh, which demonstrated the danger to be negligible.

The tests, which were performed in the course of general studies of the Bureau of Mines relative to gas hazards in mines, were made on three men confined in a closed chamber whose dimensions were 1000 cubic feet. The three subjects puffed merrily for the space of an hour and a half at cigarettes of every variety,—Turkish, Egyptian, the old Virginia brand, and the type wherein the smoker "rolls his own." Following this, the smokers drew energetically at an infinite variety of cigars—cheroots, Pittsburgh stogies, black Manilas, and Havanas of choice degree. Finally they puffed frantically at pipes, at pipes of clay and cob, at pipes of meerschaum and briar. At the conclusion of the performance the air of the closed chamber had become so smoky that it was impossible to see across the room. The atmosphere was so irritating to the eyes that it was necessary to wear goggles.

Samples of the atmosphere and blood samples of the smokers were then taken for analysis. It was found that in no instance did the carbon monoxide content of air exceed 1/100 per cent. The maximum blood saturation was 5 per cent. Some of the subjects supposedly inhaled their smoke, but the tests indicated that such inhalation, though it may have extended to the bronchial tubes, did not penetrate throughout the lungs. The tests indicate that carbon monoxide hazard from smoking indoors or in mines is negligible in itself, though the Bureau of Mines investigators consider that it may add to the smoker's hazard should he be caught by carbon monoxide from sources such as occur in the mining industry.

DIABETIC COLUMN.

The following brief report of two cases of diabetes treated by insulin brings out two very important points in the use of this most valuable, but powerful, new form of therapy.

The first case shows the importance of giving a small initial dose of insulin to any case that comes under treatment without a history of chronicity, or any evidence of acidosis, and yet showing a large amount of sugar in the urine, with a high blood sugar.

The second case shows the absolute futility of giving insulin without accurately controlled diets.

CASE 1. Mr. C., male, age 30, married, white, sought medical advice on account of loss of weight. During past nine months had lost from 205 to 180, especially rapid during the past month. For past three months polyuria and thirst. For past month dry mouth. Always a large eater of all kinds of food. No other symptoms. Weight at 25 years of age, 160 pounds. Rapid gain since marriage five years before onset of present illness.

On physical examination, except for pallor, dry sticky tongue, and teeth in very poor condition, nothing was made out. Pulse 72 and regular, blood pressure 130/80, weight 174 dressed, height 5 feet, 10½ inches with shoes.

Urine examination (single specimen): Specific gravity 1039, containing 7 per cent. of sugar, with one plus di-acetic acid. There was no albumin, and the sediment was negative.

The blood smear was negative. Wassermann negative; blood sugar, four hours after eating, 0.49 per cent.

Patient, sent immediately to the hospital, was put on a diet of carbohydrate 66, protein 24, fat 37, total calories 693, and had one-third of this diet for the evening meal preceded one-half hour by one unit of insulin. Fluids were forced during the night. During the evening patient sweated profusely, but had no other symptoms suggesting a reaction, and no blood sugar was done until 7.30 the following morning. Single specimen of urine at 6.30 A.M. was found to be sugar-free, and the blood sugar at 7.30 was found to be 0.07 per cent.

Patient remained in the hospital for three weeks. Diet was worked up to, carbohydrate 107, protein 82, fat 145, equalling 2061 calories, giving the patient 26 calories per kilo.

Final insulin dosage was nine units one-half hour before breakfast, and eight units one-half hour before supper, and the diet arranged so as to have two-fifths of the total diet for breakfast and supper, and one-fifth at lunch. Blood sugar remained below 0.10 per cent., the last report being 0.09 per cent. Patient has had no reactions, and his weight, which was 164 (stripped) on entering the hospital, had increased to 174 during the three weeks' stay in the hospital.

CASE 2. Mrs. F., widow, age 40, white, with a history of severe diabetes for three and one-half years. Loss of weight from 135 in 1915 to 86 at the time of first visit. Height, 5 feet, 4 inches. All of the cardinal symptoms at the time of onset of diabetes. During first ten months of treatment, strict diet without results. For the following two years, "Allen's Starvation" treatment, and during this time was sugar free, but lost weight and strength steadily. Four months ago started the insulin treatment, being given 30 units a day in 10-unit doses, and diet increased without limit. Sugar in the urine at onset

of insulin treatment, 7 per cent., with a blood sugar of 0.52 per cent.

Under the above treatment urinary sugar dropped to 4 to 5 per cent., and the blood sugar "fell satisfactorily" to 0.32 per cent., but patient still lost strength and weight.

When first seen patient had 5.5 per cent. of sugar in a single specimen, no acid, and the blood sugar was 0.32 per cent.

Except for emaciation, physical examination was negative.

On diet of carbohydrate 68, protein 24, fat 37, a total of 693 calories, and with insulin dosage worked up two units per dose, to 10 units three times a day, patient became sugar free in three days, the blood sugar fell to normal, 0.10 per cent., and with the same dosage of insulin this diet was rapidly worked up to 75 grams of carbohydrate with a gram of protein per kilo, and 30 calories per kilo for total diet.

Insulin dosage was rearranged to 10 units twice a day with a light lunch. Patient gained three pounds during two weeks, with marked increase in strength and a disappearance of symptoms. Patient still in the hospital.

F. GORHAM BRIGHAM, M.D.

News Items.

DR. JAMES A. HONEIJ has moved his office from 385 Marlborough Street to 311 Beacon Street.

ILLINOIS RESEARCH LABORATORY.—By the enactment of a bill the University of Illinois will receive a grant of \$400,000 for a medical research laboratory.

DR. JACQUES LOEB.—Dr. Jacques Loeb, of the Rockefeller Institute for Medical Research, has had the title of doctor *honoris causa* conferred on him by the University of Strasbourg.

DR. WILLIAM W. KEEN.—Dr. Keen, who is eighty-six years old and who has completed fifty years of service as a member of the Board of Trustees of Brown University, has sailed for Europe.

CHANGE OF OFFICE.—Dr. Dana W. Drury has removed to The Marlborough, 416 Marlborough Street, corner Massachusetts Avenue.

Dr. Edward F. Shay's address has been changed from 270 Commonwealth Avenue, Boston, to 422 North Main Street, Fall River, Mass.

DR. FLORENCE MEREDITH of Boston has accepted the position of Head Physician and Professor of Hygiene at Smith College. For the past three years Dr. Meredith has been Professor of Preventive Medicine and Hygiene at the Woman's Medical College of Pennsylvania.

HARVARD CANCER COMMISSION.—The John Hancock Life Insurance Company, which had previously given \$30,000 toward the construction of the Collis P. Huntington Hospital, has recently made an additional gift of \$20,000 to the Harvard Cancer Commission. Of this sum, \$15,000 will be placed in the permanent fund, and \$5,000 will be used for the installation of diagnostic apparatus.

WEEK'S DEATH RATE IN BOSTON.—During the week ending August 4, 1923, the number of deaths reported was 151, against 169 last year, with a rate of 10.22. There were 21 deaths under one year of age, against 20 last year. The number of cases of principal reportable diseases were: Diphtheria, 42; scarlet fever, 16; measles, 20; whooping cough, 8; tuberculosis, 51. Included in the above were the following cases of non-residents: Scarlet fever, 1; whooping cough, 1; tuberculosis, 3. Total deaths from these diseases were: Diphtheria, 1; scarlet fever, 1; tuberculosis, 17. Included in the above were the following cases of non-residents: Diphtheria, 1; tuberculosis, 1.

All of the manuscript of the History of the Massachusetts Medical Society has now been put into type, the illustrations are finished, and proof-reading is in progress. The interest in this undertaking of the Secretary of the Society among the District Medical Societies is considerable. Subscriptions are coming in all the time. Those who have not entered their subscriptions may do so by sending their names to Mr. James F. Ballard at the Boston Medical Library, and thus assure enough funds to pay the costs of publishing a work which will redound to the credit of the old Society of which we are all so proud. The Secretary has given his time and labor for seven years to the preparation of this book; he should not bear the expense of publishing it.

Obituary.

LEWIS SEVER DIXON, M.D.

DR. LEWIS SEVER DIXON died of apoplexy at his home in Boston, August 5, 1923, at the age of seventy-seven.

He was the son of Dr. Rufus E. Dixon, who for a period of fifty years practiced dentistry in Boston. Lewis was born in New York September 26, 1845, was graduated from Harvard College in the Class of 1866, and from Harvard Medical School in 1871, serving as house officer at the Boston City Hospital, and beginning practice as an ophthalmologist.

He married Ellen Rebecca, daughter of William Burrage of Jamaica Plain, in 1873, and set-

held in practice as an ophthalmologist in Worcester, Mass. There he was ophthalmic surgeon to the Worcester City Hospital, enjoyed a large practice, and had membership in the New England and American Ophthalmological Societies, and the Massachusetts Medical Society. Dr. Dixon moved to Boston in 1886, and was assistant ophthalmic surgeon at the Boston City Hospital for several years, finally relinquishing hospital service for private practice, being especially skilled in the department of refraction.

His wife died ten years ago. Their only child, Roland Burrage Dixon, is professor of anthropology in Harvard University.

Dr. Dixon will be remembered by a large circle of patients and friends as a most kindly, genial personality, a man who possessed a mechanical bent to a high degree, and an interest in a wide range of subjects coupled with the capacity to work intensively.

THOMAS W. GREEN, M.D.

DR. THOMAS W. GREEN of 62 Washington avenue, Chelsea, who died suddenly at his summer home at Limerick, Me., Aug. 7, was sixty years old and a son of former Mayor Thomas Green of Chelsea. He was born in Chelsea Aug. 3, 1863, and was graduated as doctor of medicine from the Boston University School of Medicine in 1891, taking up his practice in Chelsea the following year. At the time of his death he was medical director for the Edison Electric Illuminating Company of Boston and was a member of the staff of the Chelsea Memorial Hospital. Besides his widow, who was Miss Ethel Gould of Chelsea, he is survived by one daughter, Miss Virginia Green, by a former marriage; and two sisters.

Correspondence.

THE COMMONWEALTH OF MASSACHUSETTS.

DEPARTMENT OF PUBLIC HEALTH.

Boston, August 1, 1923.

Mr. Editor:

For a number of years this Department has been conducting a campaign against diphtheria, and, realizing the great value of the Schick test and diphtheria toxin-antitoxin mixtures as preventive measures, we have been advocating their use throughout the state. Our adoption of these two procedures was based on the wide experience of Dr. Park and his associates in New York, and on our own experience extending over several years in this state. Convinced of the efficacy and harmlessness of the Schick test and the toxin-antitoxin immunization, we have urged that these procedures be carried out by boards of health, by school committees and by all members of the medical profession. This diphtheria prevention work has been taken up in many state and private institutions, in the larger hospitals, by many boards of health, in a considerable number of schools, and by numerous practicing physicians. The results

obtained by the application of these two agencies have been most gratifying, because diphtheria has been entirely prevented wherever they have been applied and we have yet to learn of any untoward results.

During the last school year "An Open Letter Concerning the Schick Test" was sent out by the Medical Liberty League of Boston to school committees, principals and teachers. This letter, by its half statements, inferences and implications, conveys a wrong estimate of the agents used so successfully in this and other states for the prevention of diphtheria, and is, we feel, pernicious in its influence, in that it prejudices school officials against these agents, and induces parents to refuse for their children this efficacious and harmless protection against diphtheria.

We have learned that this letter has influenced some school officials and teachers against this valuable work, and for this reason we feel that it is desirable to present for your consideration the following discussion of that letter, a copy of which has probably come to your attention:

In this so-called "Open Letter Concerning the Schick Test," the Medical Liberty League puts forth arguments to the effect that toxin-antitoxin is a dangerous biologic agent and that its use does not confer immunity to diphtheria.

In the second paragraph the statement is made, "The Schick test itself may not be seriously dangerous, except in the case of a highly sensitive child." So far as is known, the Schick test is never dangerous.

"What of its safety?" The statements made concerning the experience at Dallas, Texas, are substantially correct, but the accidents quoted were due to the fact that the commercial laboratory supplying the toxin-antitoxin mixture failed to test properly this particular lot, and its officers have been held liable for the accidents. Furthermore, this experience took place in the autumn of 1919 and since that time the federal government has assumed supervision of the manufacture and distribution of diphtheria toxin-antitoxin mixture. All lots of this product now manufactured, including those made at the Antitoxin and Vaccine Laboratory of the Massachusetts Department of Public Health, must be prepared and tested according to the specifications promulgated by the United States Hygienic Laboratory, and samples of each lot must be forwarded to the Hygienic Laboratory for additional purity and potency tests. The experience at Macon, Georgia, was due to similar circumstances.

"Significant admissions." Dr. William H. Park is quoted as saying that the constitutional reactions following the injection of toxin-antitoxin mixture may be moderate or severe in 10 per cent. of children. This statement is substantially true, although this percentage is considerably higher than that observed in Massachusetts. These reactions are somewhat similar to those following the injection of typhoid-paratyphoid vaccine and are not harmful. We have yet to learn of any harmful results following the injection of diphtheria toxin-antitoxin in this state.

The "Letter," under the heading, "Not harmless to guinea-pigs," quotes Dr. Zingher's description of the usual safety tests carried out to insure the harmlessness of toxin-antitoxin mixture. The implied inference is unfair. Guinea-pigs are not human beings. The guinea-pigs used in the test are approximately one-half a pound in weight, whereas toxin-antitoxin would not be given to any human being weighing less than ten pounds—that is, twenty times the weight of the guinea-pig. Therefore, the amount of toxin-antitoxin mixture recommended, just as would be the case with many therapeutic agents, is entirely harmless to a child, but may produce paralysis in

guinea-pigs. As a matter of fact, the paragraph quoted from Zingher is, in its essentials, the federal regulation as a test both of potency and harmlessness.

The "Letter" states that there is "No guarantee of safety," in so far as state products are concerned. Outfits for the Schick test and diphtheria toxin-antitoxin mixture, as manufactured by commercial laboratories and by the Antitoxin and Vaccine Laboratory of the Massachusetts Department of Public Health, are prepared and tested according to revised federal regulations and are also submitted to the United States Hygienic Laboratory for further check tests. The products, therefore, meet all specifications as required by federal law.

Under the heading, "*Its value questioned*," a statement of Dr. John F. Hogan is quoted which conveys the impression that because the majority of deaths from diphtheria occur in children of pre-school age, "performing Schick tests and immunizing school children is of little value in the control of diphtheria, etc." In the first place, the statement of Dr. Hogan is misleading, because he quotes only laryngeal deaths. In the state of Massachusetts approximately 50 per cent. of all cases of diphtheria occur in children of school age. Therefore, it is necessary to immunize school children as well as children in the pre-school years.

In regard to the quoted statements of Dr. James Gordon Cumming, so far as can be ascertained, none of the leading authorities in diphtheria in this country endorses the views of Dr. Cumming. On the contrary, the consensus of opinion is that Dr. Cumming is entirely wrong in his conclusions.

"A rival of the Schick test." So far as is known, the test advocated by Dr. Kellogg has not been adopted to any extent. The Schick test is far simpler than the test which Dr. Kellogg describes. The statement of Dr. Kellogg, "The process of finding the minimal lethal dose of a toxin is so tedious and so many guinea-pigs are required that only the most conscientious manufacturers put out a reliable product," is unfair and is not warranted by the facts. All manufacturers must conform to federal regulations in testing toxin for the Schick test and the diphtheria toxin-antitoxin mixture. The reliability of the products put out by the various manufacturers is also controlled by subsequent tests at the United States Hygienic Laboratory before any lots can be released for distribution.

Under the heading, "*What of immunity?*" reference is made to an article by Dr. Blauner, in which it is stated that diphtheria occurred among supposedly immune children. In all fairness, the article by Dr. Blauner should have been followed by an article by Dr. William H. Park which appeared in the *Archives of Pediatrics* in June, 1921. The experience of Dr. Blauner has been investigated and there is reason to suppose that the children described by Dr. Blauner were suffering from an acute streptococcus infection and not from diphtheria.

"Where will it end." The suggestion of Dr. Herbert R. Brown to immunize expectant mothers has little to recommend it, and, so far as can be learned, the plan proposed by Dr. Brown has been nowhere adopted. Dr. Zingher's statement that he plans to omit the Schick test and give injections of toxin-antitoxin to all children between the ages of six months and six years is an entirely reasonable procedure, because the Massachusetts statistics show that the great majority of children within these age limits are susceptible to diphtheria.

More recently the Medical Liberty League has made especially vigorous protests against the Schick testing and immunization of school children. They base their objection on the fact that the majority of deaths from diphtheria occur in children of the

pre-school age, and they say, "We regard the Schick testing of children of school age and the subsequent inoculation with toxin-antitoxin as almost entirely useless." This objection has no foundation in fact. In the first place, the state records show that in 1922, of a total of 8826 cases of diphtheria only 2643, or approximately 30 per cent., occurred in children of pre-school age; whereas 4394 cases, or nearly 50 per cent., occurred in children between the ages of 5 and 14, and 4745 cases, or 53.7 per cent., were in the group 5 to 19 years inclusive.

The facts are these: The majority of cases of diphtheria occur in children of school age, and the school serves as a place of dissemination of the infection; many then take the infection home and transmit it to their brothers and sisters, and these younger children succumb to the disease more readily than the older children. In other words, the majority of the cases of diphtheria occur among school children—the majority of deaths from this disease occur in children of pre-school age.

If we are to control diphtheria, it is essential that not only should the children of pre-school age be immunized, but that the susceptibles among school children be discovered by means of the Schick test and that they be protected against this disease by toxin-antitoxin immunization.

The concluding headings require no further discussion.

From the experience gained during the past nine years, during which time the Schick test and diphtheria toxin-antitoxin have been actively used for the prevention of diphtheria, it seems definitely established that we have in these two procedures harmless, efficacious and most valuable weapons against diphtheria. In approximately 90,000 individuals who have been given the Schick test, and in approximately 40,000 individuals in the state of Massachusetts who have been injected with diphtheria toxin-antitoxin injections, we have yet to learn of a single harmful result. In view of the fact that every case of diphtheria reported in Massachusetts has occurred in individuals who were either Schick positive or who had not been immunized with toxin-antitoxin mixture, it would seem that those who oppose the Schick test and the use of toxin-antitoxin mixture assume a very grave responsibility when they urge others to discourage the use of these agents.

In order that the medical profession may realize more fully the extent to which the Medical Liberty League is going to combat this program of the Department, I would greatly appreciate it if this letter might be published in the *Boston Medical and Surgical Journal*.

EUGENE R. KELLEY,
Commissioner of Public Health.

LETTER FROM INDIA.

By the courtesy of Dr. HARVEY CUSHING we are permitted to publish this interesting letter from India.

ONGOLE, GUNTUR DISTRICT, INDIA.
July.

Dear Dr. Cushing:

I have had it in mind for some time to write to you, mainly for the purpose of thanking you for the start you gave me in surgery. But I have delayed in the hope of being able to include an interesting account of my experiences in India. However, it requires a long time and a great deal of monotonous work before one can even start in medical missionary work. The result has been that although my wife and I sailed from New York in September, 1921, I have had only six months of hospital experience in India up to the present. But even at the risk of being tiresome, I

shall just record briefly how we have spent our time since I left the Brigham in June, 1920.

You may recall that through your kindness and that of Dr. Cutler, I was enabled to spend a year in the surgical service of the New Haven Hospital. That was in some ways a valuable year, although there were a few disappointments.

Soon after leaving New Haven, we went to London on our way to India. We spent three months in London, where I attended the autumn course in the London School of Tropical Medicine. That was a valuable experience. Although there was a deficiency of illustrative clinical material, the school was in all other respects all that one could ask for. We enjoyed London very much, although we suffered bitterly with the cold.

As soon as possible after the examination in the school, we sailed from Liverpool to Bombay—a delightful three weeks on the water. Our first ten months in the country were spent exclusively in the study of the Telugu language. At the end of that time I took the first of two examinations in Telugu, the second of which is still before me. However, it is the custom, after the first is passed, to divide one's time between language study and some regular missionary work. I planned just after the examination to spend three months in the Madras Government Ophthalmic Hospital for the experience—an opportunity which I secured through Lieut.-Col. Robert Elliot of London, a former director of this hospital. I was forced, however, by the pressure of work in the mission hospital to which I had been designated, to give up that much cherished plan.

We entered on our medical work in Ongole in December of last year. Ongole is a town of 10,000 people, 150 miles north of Madras, and 10 miles from the Bay of Bengal. It is on the main line of railway between Madras and Calcutta. It has been occupied by the American Baptist Mission for about 50 years, and is the seat of many activities, including a high school and a number of lower schools, industrial work, and latterly a hospital. The latter is new, indeed the actual building work is barely completed, and the hospital, which consists of about twenty buildings and occupies a compound of several acres, is by far the most pretentious hospital in this mission. Its capacity is about 85 beds, and it includes medical, surgical, children's, and obstetrical wards, as well as private quarters for Europeans and well-to-do Indians, also a dispensary and operating block. Indian custom and precedent requires that the relatives of the patients stay with the latter, up to the number of 20 to 30 relatives per patient, and feed and nurse him. The hospital is therefore provided with living and cooking accommodations for this horde of relatives. There are nurses as well, and only male nurses attend to male patients. An interesting feature of the hospital is the 7-foot wall passing down through the center, separating the men from the women. This is such an immoral country that it is impossible to conduct a reputable hospital, they say, without such a barrier as this between the two sides; and even this arrangement is viewed with a good deal of misgiving by many people of experience.

But properly to appreciate how great an achievement it is to build such a mission hospital, one must realize how it is done. The mission policy in the past has been to have one, or rarely two, American physicians on the staff of each hospital, with perhaps an Indian assistant. And the physicians in charge are expected in most cases to build the hospitals themselves, besides attending to every detail of the conduct of the work, and even to evangelistic work as well. Obviously, without anything but admiration for my predecessors, I can only say that, considering only the medical aspect of the work, our mission hospitals have been very far from what we in America would consider even fairly good. Dr. Stenger, with whom I have been associated, has had almost the

entire responsibility of the erection of this hospital, and although without training as a builder, has done it without help, except that of a few Indian contractors and an unlimited supply of coolies. He has also carried along several other lines of work at the same time, including the medical work entailed by the opening of the wards. Manifestly, if I make critical remarks about the hospital and its organization, I am not criticizing Dr. Stenger. And if I say that the past six months have been above all else a time of disillusionment for me, I hope I will not be misunderstood. I am most fortunate to be situated in this hospital just after the disagreeable work of construction is finished.

I have said that externally the hospital is good. As for equipment, it is sadly deficient. We have a laboratory, so called, and I have gathered enough materials to do the usual tests on urine, sputum, blood, etc., but we have no facilities for examining tissue, or for doing any kind of bacteriological work, nor indeed anyone to do the work if we had the facilities. There is no x-ray. Illumination at night is by kerosene lanterns, and when the nurse on duty steals the oil out of the lantern, the ward is in darkness the rest of the night. When a patient was brought to the hospital with simple fractures of both femora, there being no splints in the hospital, I had to get busy with hammer and saw and an old crate and make a pair of Hodggen splints. We have running water, except when one of those ubiquitous relatives draws off all the water to do his week's washing. There is no bathroom plumbing. We have a satisfactory sterilizer, and on the whole the operating room equipment is fairly good. The assortment of instruments is such as to enable us to do most of the common operations. In fact, in this respect, the equipment is out of proportion to the organization and experience of the staff. We have an Indian assistant, a graduate of Madras University. The men trained in the Indian medical schools have an extraordinary knowledge of drugs, and can write the most astoundingly long prescriptions. Their training is evidently designed to suit the demand of the people, who have the utmost faith in medicine, in fact an inordinate fondness for it. They think that every disease has its appropriate drug or mixture, and they also have a firmly rooted belief that no disease can be cured without medicine. If a pneumonia or typhoid patient does not get some medicine to drink at least three times a day, the relatives will take him home. The passion of these people for drugs is almost incredible. The result is that there are great numbers of them who have a little knowledge of a few drugs, and they drink them themselves in great quantities, and bail them out to the other people, and thereby make a substantial living. The average, moderately well educated man in the street knows about as much about drugs as I do, and talks about them far more glibly than I can. I find it necessary to study the materia medica a good deal.

The foregoing enables one to judge what must be the standing of surgery among these people. Operation is synonymous with death, and is unnecessary anyway, as every disease can be cured if only the right medicine is used. That was another of my disillusionments—to find that the people wanted no surgery. But I am glad to say that the sentiment against surgery has undergone a very gratifying change in these six months. Since the first of January I have done 60 operations, counting every case for which I have taken the patient to the operating room. The 60th case was the only fatal one—a case of ectopic pregnancy, operated on probably about six weeks after rupture had taken place. It is interesting that even in her dark skin, the bluish discoloration of the umbilicus described by Cullen, was very conspicuous. One cannot generalize from such a short experience as I have had, but one gains the impression that appendicitis is less common than in

America. We have had two cases, one of whom refused operation. Malignant tumors are perhaps less common here than in America. One thing is certain, that by the time they present themselves for treatment, they are almost always inoperable. I have come across two breast cancers, two cervical cancers, one betel nut cancer (of the cheek), one cancer of the ovary (?), one cancer of the penis, and one sarcoma (?) of the mediastinum. The penile cancer was the only one that offered any hope, and that I am told has recurred already. Our surgical work is done under difficulties, which I might illustrate by a single case. I hope it will not be considered boasting. It is rather a confession of how poor our organization is, and I consider the favorable outcome as strictly providential. The patient was a wealthy farmer who had had epigastric pain for five years. He had emaciation, tarry stools, coffee ground stomach contents, and for some hours after each meal a fluctuant tumor in his epigastrium. We saved him the annoyance of gastric analysis and x-ray examination for the sufficient reason that we had no facilities for doing either. There seemed to be nothing further to do but to operate on him. He consented, against the advice of all his friends and relatives, of whom there was a full quorum. Our surgical team consisted of our American nurse, who gave the chloroform and attended to the room; a male nurse as first and only assistant who had never before had on a sterile gown; and myself, who had never done a stomach operation. I was obliged to do the sterile nurse's work first, then help to dress the first assistant, and then prepare the patient. However, all went smoothly. The relatives sat quietly and made no disturbance. There was an indurated scar at the pylorus, and we did the usual posterior gastro-enterostomy, but not so well as it is usually done. The convalescence was very smooth, and when I saw the patient a month and a half later, he was fat and very grateful. He derives a great deal of satisfaction from exhibiting his epigastric scar. In this country it is not at all had form to display one's epigastrium. This patient, being an influential man, has done the hospital a great deal of good, but I hope that our organization may improve to the extent that we will not have to rely on luck for a favorable outcome. It seems to be the experience of medical missionaries in India that the most promising department of medical work is surgery. Hitherto there has been almost no surgical work in our Ongole hospital, so there is really a good opening. There are a few large surgical clinics in mission hospitals in India, but none in our part of the country. An American named Dr. Wanless, on the Bombay side, has a very wide reputation as a surgeon in this country.

When I reached Ongole, we had a few cases of a fever which was being called malaria, influenza, and other names by our Indian assistant. A number of them died, with jaundice. On blood examination they turned out to be cases of relapsing fever. We soon began to treat the patients with neo-salvarsan intravenously, with almost invariably excellent results with a single dose. Since then we have had over 500 cases of relapsing fever, and that also has done the hospital a great deal of good. A typical case of this Indian form of the disease, if allowed to run its course, is about as follows: sudden onset with fever to 104 or 105, persisting at that level for a week and terminating by crisis. Then 7 to 9 days of remission, during which the patient may be walking about. Then the first relapse, just like the initial attack, except the duration is only 3 to 4 days. This is terminated by crisis and followed by a week or more of remission. A second relapse does not usually occur, and if it does, it lasts only a few hours. Throughout the disease and far into the period of convalescence pains in the joints are very troublesome. The parasites are usually present in great numbers during the febrile periods, except at the

beginning, when they are usually scanty. In almost every case if neo-salvarsan is given reasonably early and in proper dosage, the temperature is normal within 36 hours and does not rise again. Although we have had a valuable experience with the disease, there has been no time for even the simplest research, nor even for white counts or urines. Blood smears, however, we have made on practically every case. Our part of the country has been swept by a very serious epidemic of this disease, which because of the ignorance and filth of the people, has carried off thousands in the villages. From all that the residents and the medical authorities and the newspapers say, the disease has been unknown in our part hitherto. We have many cases of fever in which we are unable to make a diagnosis. Most are of short duration and there is almost no mortality.

The hospital has never been filled since it was completed, but the number of patients is increasing rapidly. Last year there were 500 patients; this year there were 800 in the first five months. Even this number keeps one busy beyond the point of efficiency. Our problem is largely one of training assistants. We have recently secured a man who is already very useful, although he had had no hospital experience when he came to us. He has learned to do almost all of the ordinary laboratory procedures. He takes the bloods, stains them, finds the parasites, and gives the neo-salvarsan intravenously. He has given chloroform a number of times, and has assisted once or twice in operations. He keeps the records. Our records are as yet very sketchy and would hardly bear comparison with those at the Brigham, but they are improving. In Ongole, as in most towns of moderate size, there is a government hospital and dispensary. Generally speaking, these institutions are in bad repute amongst the people, because of the extortion and bribery that are practised. The man in charge of the one in Ongole, however, is considerably above the average, and his hospital is relatively good, so that in a sense our mission hospital is not essential to the life of the community.

I have said nothing about the religious aspect of this work. As yet my inadequate use of Telugu and my lack of freedom from other work has kept me from doing anything much. However, the hospital maintains an evangelist, an Indian, and in that respect is better equipped even than our more distinguished contemporary, the Brigham Hospital.

I recall, Dr. Cushing, with a great deal of gratitude, your kind interest in our financial situation just before I left the Brigham to go to New Haven. On that account I want to tell you that, although we are living on a salary which would seem small in dollars, it is not only adequate in rupees, but enables us to save regularly without any stringency. We have one child nearly three years old.

In closing, I wish to thank you again for the help you gave me in 1919 and 1920. It has been worth a great deal to me to know that what I learned then was learned from the highest authorities, and therefore was as nearly trustworthy as anything can be in medical science. But much more important than any knowledge that I gained was the influence that accrued from seeing that high standard of surgical thought and technique in actual operation.

Mrs. Boggs joins me in sending our warmest regards to you and Mrs. Cushing.

Sincerely yours,
ARTHUR G. BOGGS.

OUR LEGAL BONDAGE.

Mr. Editor:

The recent renewals of narcotic registrations and liquor permits have brought up afresh the perennial nuisance of being compelled to confirm our every statement by swearings and solemn oaths. What with automobile registrations, driving licenses, and

income-tax returns, together with the above and other items, the physician must needs wear a beaten path from his door to that of the notary. If this is really necessary, let us swallow the implied insult, and bear cheerfully the added burden imposed upon us. The necessity is, however, by no means obvious, since penalties of exemplary severity could easily be attached to the making of false statements over a simple signature. The petty official mind is notoriously fond of red tape and traditional methods, and is most reluctant to abate one jot or tittle of these for any reason so unimportant as the convenience of non-official people. A proper appeal to those really in authority should result either in the discontinuance of this nuisance, or in the offering of reasons for it which are not now apparent.

JUS JURANDUM.

NOTICES.

POSTPONEMENT OF THE INTERNATIONAL CONGRESS OF OPHTHALMOLOGY (1925).

The Committee of British Ophthalmologists appointed to organize an International Congress in 1925 finds, with regret, that it is unable to do so in accordance with the conditions under which the British invitation was accepted by the Washington Ophthalmological Congress in 1922. It will be remembered that at Washington it was decided that the next Congress should be strictly international and that German should be one of the official languages. The committee has since been informed that the Société Française d'Ophthalmologie, the Société d'Ophthalmologie de Paris and the Société Belge d'Ophthalmologie have passed resolutions to the effect that they feel themselves unable to participate in a Congress if Germans are invited. The committee is of opinion that to proceed with the Congress in these circumstances would tend to perpetuate a schism in the ranks of ophthalmology and militate permanently against the progress of the science, which all desire to promote. The committee has, therefore, reluctantly decided to postpone the Congress.

BOSTON HEALTH SHOW.

OCTOBER 6 TO 13, 1923—MECHANICS HALL.

Held under the Auspices of

Boston Health Department,
Massachusetts Department of Public Health,
Boston Health Exhibit Committee.

Cooperating:

Suffolk County Medical Society,
Norfolk County Medical Society,
Massachusetts Homeopathic Medical Society,
New England Pediatric Society.

Beneficiaries:

Boston Health League, Inc.,
New England Health Institute.

NATIONAL HEALTH SHOWS, INC., COÖPERATING.

Felix Mendelsohn, *Managing Director*.

C. St. Clair Drake, M.D., *Educational Director*.

EDUCATIONAL DISPLAYS,

COMMERCIAL EXHIBITS,

ENTERTAINMENT.

Executive Committee—Francis X. Mahoney, M.D., Chairman, Commissioner, Boston Health Department, Eugene R. Kelley, M.D., Commissioner, Massachusetts Department of Public Health, Henry Copley Greene, Secretary, Health Exhibit Committee; Executive Secretary, Health Service, Metropolitan Chapter, American Red Cross. Lila Owen Burbank, M.D., Vice-Chairman, Health Exhibit Committee, Mary Beard, R.N., Chairman, Health

Exhibit Committee; General Director, Community Health Association.

Board of Control—Robert W. Kelso, Executive Secretary, Boston Council of Social Agencies, Mary R. Lakeman, M.D., Chairman, Public Health Committee, City Federation of Women's Clubs, Willard D. Brown, Boston Metropolitan Division, Girl Scouts, William W. Howell, M.D., Norfolk County Medical Society, Mabel R. Wilson, Director, Social Service Department, Children's Hospital, Ruth Page Sweet, Physical Director, Boston Young Women's Christian Association, Donald North, Executive Secretary, Boston Council of Boy Scouts, Samuel Clement, M.D., Homeopathic Medical Society, Horace Morison, Executive Secretary, Boston Health League, Inc., G. H. Roehrig, Community Secretary, Boston Young Men's Christian Association, Eva Whiting White, General Director, Community Service, Inc., Robert H. Vose, M.D., Suffolk County Medical Society, and Members of the Executive Committee.

Special Committees—*Program Committee*: Chairman, Lila Owen Burbank, M.D. (a) Speakers and Meetings: Chairman, R. W. Carey, M.D.; H. E. Miner, M.D., Horace Morison. (b) Motion Pictures: Chairman, Professor C. E. Turner, Department of Biology and Public Health, Massachusetts Institute of Technology. (c) Pageant: Chairman, Eva Whiting White. (d) Music: Chairman, Mrs. Paul H. Kelsey. (e) Parenthood Institute: Chairman, Professor Ernest Groves. (f) Demonstration, Physical Exercises: Chairman, Carl L. Schrader. (g) Dancing: Chairman, Mary Driscoll. *Publicity Committee*: Chairman, Professor C. E. Bellamy, Boston University, School of Business Administration. *Public Health Nursing Committee*: Chairman, Sophia Nelson, R.N., Director, Nursing Service, Boston Health League.

CLASSIFICATION OF EDUCATIONAL EXHIBITS.

I. Information Booth.

II. Health Environment.

Section Chairman, F. X. Mahoney, M.D., Boston Commissioner of Health.

Vice-Chairmen, M. Victor Safford, M.D., Deputy Boston Commissioner of Health; Stephen Maloney, Executive Secretary, Boston Health Department.

1. City Planning—Chairman, Elizabeth Herlihy, Secretary, City Planning Board.
2. Housing—Chairman, Thomas Jordan, Director, Sanitary Division, Boston Health Department.
3. Sanitary Engineering—Chairman, Joseph A. Rourke, Commissioner Boston Public Works Dept.
Sub-Committee on Waste Disposal—Chairman, Mr. Rourke.
4. Ventilation—Chairman, Joseph B. Howland, M.D., Superintendent Peter Bent Brigham Hospital.
5. Food Inspection and Adulteration—Chairman, Herman C. Lythgoe, Director Division of Foods and Drugs, Massachusetts Department of Public Health.
Sub-Committee on Milk Inspection and Adulteration—Chairman, James O. Jordan, Inspector of Milk, Boston Health Department.

III. Control of Communicable Diseases.

Section Chairman, Eugene R. Kelley, M.D., Massachusetts Commissioner of Health.

Vice-Chairman, Bernard W. Carey, M.D., Director Division of Communicable Diseases, Massachusetts Department of Public Health.

1. Vital Statistics—Chairman, Prof. E. B. Wilson, Harvard School of Public Health.

2. Communicable Diseases—Chairman, Edwin H. Place, M.D., Boston City Hospital.
 3. Biologics—Chairman, Dr. Robert Nye, Antitoxin and Vaccine Laboratory, Massachusetts Department of Public Health.
 4. Diphtheria Prevention—Chairman, Dr. John A. Ceconi, Boston Health Department.
- IV. *Health of Mothers and Young Children.*
 Section Chairman, Winifred Rand, R.N., Director Division of Child Hygiene, Community Health Association.
 Vice-Chairman, Frances Klein, Pre-School Age Work.
- V. *Health of School Children.*
 Section Chairman, Jeremiah E. Burke, Superintendent of Schools, Boston.
 Vice-Chairmen, Helen McCaffrey, R.N., Boston School Department; Alfred Whitman, Executive Secretary, Children's Aid Association.
1. School Hygiene—Chairman, William H. Devine, M.D.
 2. Child Caring Agencies—Chairman, Cheney Jones.
 3. Play and Physical Education—Chairman, Nathaniel Young.
 (a) Recreation—Chairman, Eva Whiting White.
 (b) Physical Education—Chairman, Carl L. Schrader.
 (c) Scouting—Chairman, Donald North and Dorothy Dean.
 (d) Red Cross—Chairman, Henry Copley Greene.
 4. Settlements—Chairman, Albert J. Kennedy.
 5. Nutrition for School Children—Chairman, Elizabeth W. Schermerhorn.
 6. Massachusetts Child Labor Commission—Chairman, Mrs. Kenneth E. Appel.
- VI. *Health and Prevention.*
 Section Chairman, David L. Edsall, M.D., Harvard University Medical School.
 Vice-Chairman, Roger I. Lee, M.D., Director Physical Education, Harvard University Medical School.
1. Safety—Chairman, Lewis E. MacBrayne, General Manager, Massachusetts Safety Council.
 2. Industrial Hygiene—Chairman, Wade Wright, M.D., Instructor of Industrial Medicine, Harvard University Medical School.
 3. Social Hygiene—Chairman, J. D. Barney, M.D., Urologist, Massachusetts General Hospital.
 4. Health Centers—Chairman, Charles F. Willmsky, M.D., Director, Boston Health Unit.
 5. Food and Adult Health—Chairman, Elizabeth W. Schermerhorn, Secretary, Women's Educational and Industrial Union.
 6. Prevention of Blindness—Chairman, Robert I. Brannall, Director, Division of the Blind, Massachusetts Department of Education.
 7. Prevention of Deafness—Chairman, Calvin E. Faunce, M.D., Assistant Surgeon, Massachusetts Eye and Ear Infirmary.
 8. Prevention of Heart Disease—Chairman, Paul Dudley White, M.D., Chief Director Cardiac Clinics, Massachusetts General Hospital.
 9. Orthopedics—Chairman, Mark Rogers, M.D., Assistant Professor, Orthopedic Surgery, Tufts Medical School.
 10. Mouth Hygiene—Chairman, Harold DeW. Cross, D.M.D., Director, Forsyth Dental Infirmary.
 11. Mental Hygiene—Chairman, George M. Kline, M.D., Commissioner, Massachusetts Department of Mental Diseases.
 12. Prevention of Cancer—Chairman, Robert B. Greenough, M.D., Director Cancer Commission, Harvard University.
 13. Tuberculosis—Chairman, Bernice W. Billings, R.N., Secretary Boston Tuberculosis Association.
- VII. *Public Health Education.*
 Section Chairman, Milton J. Rosenau, M.D., Professor of Preventive Medicine, Harvard University Medical School.
 Vice-Chairman, Prof. C. N. Hilliard, Department of Biology, Simmons College.
1. Harvard School of Public Health—Chairman, M. J. Rosenau, M.D.
 2. Simmons School of Public Health Nursing—Chairman, Ann Strong, R.N.
 3. Massachusetts Institute of Technology, Department of Biology and Public Health—Chairman, Prof. Samuel C. Prescott.
 4. State Department of Public Health—Chairman, Merrill E. Champion, M.D.
- VIII. *Health and Social Welfare.*
 Section Chairman, Robert W. Kelso, Executive Secretary, Boston Council of Social Agencies.
 Vice-Chairmen, Rev. G. P. O'Connor, President, Catholic Charitable Bureau; Maurice B. Hexter, Executive Director, Federated Jewish Charities.
- IX. *Hospitals and Hospital Extension.*
 Section Chairman, Henry M. Pollock, M.D., Superintendent Massachusetts Homeopathic Hospital.
 Occupational Therapy—Chairman, John D. Adams, M.D.
- X. *Animal Health.*
 Section Chairman, Dr. Lester D. Howard, Director, Division of Animal Industry, State Department of Conservation.
 Vice-Chairman, Dr. R. E. Dyer, Chief of Dairy Division, Boston Health Department.

SOCIETY MEETINGS.

DISTRICT SOCIETIES.

September, 1923.—Meeting of Franklin and Hampshire District Medical Societies at South Deerfield.

Essex North—Combined Meeting with Middlesex North, Middlesex East and Essex South in October. Semi-annual Meeting at Haverhill, January 2, 1924. Annual Meeting at Lawrence, May 7, 1924.

STATE, INTERSTATE AND NATIONAL SOCIETIES.

September 11-12, 1923.—Celebration of the twenty-fifth anniversary of the Rutland State Sanatorium; sessions first day at Worcester; second day at Rutland State Sanatorium.

October, 1923.—Boston Health Show will be held in Boston, October 6-13, inclusive.

October, 1923.—Meeting of the American Health Association will be held in Boston, October 8-13, inclusive.

October 18-19, 1923.—Annual Meeting of New England Surgical Society in Boston.

For list of Officers of the Massachusetts Medical Society, see page xii of the Advertising Section.